EDP industry report

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REVIEW & FORECAST
Part I

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

DAVID MOSCHELLA, EDITOR AUG. 15, 1984 ● VOL.20, NO.8 P.J. MCGOVERN, PUBLISHER

IDC INTERNATIONAL DATA CORPORATION

VENDOR TURMOIL MOUNTS IN PERSONAL COMPUTER MARKET, BUT WORLDWIDE SHIPMENT VALUE TO GROW 30% PER YEAR THROUGH 1989

The PC headlines are full of pessimism. The easy sales have been made; supply is outstripping demand; margins are under fire; strategies are dubious; applications are unimaginative, and layoffs and bankruptcies are becoming commonplace. Who needs a PC anyway?

The numbers, however, tell a very different story. International Data Corporation expects that in the next six years, 73 million personal computers will be shipped in the U.S. alone. The dollar value of U.S. shipments will grow at 28.4% per year, from $8.3 billion in 1983 to a whopping $37.4 billion in 1989. U.S. vendor shipments to international markets will grow even faster, from $3.2 billion in 1983 to $19.2 billion in 1989, a compound growth rate of 34.8%.

Despite all the clamor, IBM is not devouring the entire market. IDC estimates that in 1984 IBM will grab some 35% of the $16.8 billion of worldwide PC shipments, up from 28% in 1983. As long as IBM's market share stays in the 30% to 40% range, there will be room for others to thrive, but in a market with 130 vendors, many additional failures are certain. Some key points:

- Demographics. At the end of 1983, outside of the home there was about one PC or terminal for every ten U.S. workers. Less than 20% of the white collar market has been reached.

- IBM strategy. With its announcement of the 3270 PC, the XT 370 and its new local area network, IBM has increased its emphasis on selling to its large system base.

- IBM compatibility. The success of Compaq has encouraged a move toward strict IBM compatibility by Wang, NCR and others. AT&T, ITT and the Japanese will appeal to PC retailers looking for stability, although Compaq has as good a dealer reputation as anyone.

- Apple power. With MacIntosh, Apple II and Lisa all doing well, Apple will ship nearly one million machines in 1984. 1985 looks good too.

- New vendors. A new generation of chips -- i.e., 256K RAMS and the 286, 68020, and 32032 MPUs -- and software ensures many new players.

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1983 WORLDWIDE PC SHIPMENTS -- VALUE (Left) & UNITS (Right)
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Vendor	Value ($M)	Percent	Vendor	Units	Percent
IBM	$3,230	28.0%	Commodore	2,390,000	33.7%
Apple	1,595	13.8	Texas Inst.	815,000	11.5
Commodore	881	7.6	Apple	790,000	11.2
HP	674	5.8	IBM	676,500	9.6
Tandy	638	5.5	Sinclair	550,000	7.8
Victor	440	3.8	Tandy	393,000	5.6
DEC	375	3.2	Atari	250,000	3.5
Osborne	279	2.4	Osborne	160,000	2.3
Kaypro	203	1.8	Kaypro	113,000	1.6
Zenith	180	1.6	DEC	105,500	1.5
Others	3,060	26.5	Others	825,000	11.7
Total	11,555		Total	7,068,000	

Note: Value of shipments reflects retail pricing. Not all of the value goes to the manufacturer.

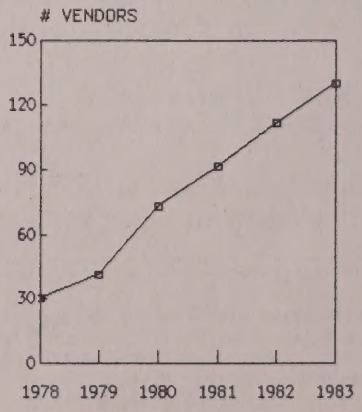
LEADING PC VENDORS, DOLLAR VALUE OF SHIPMENTS, 1980-1984
(Copyright 1984 -- International Data Corporation)

1980	1981	1982	1983	1984 (est.)
Apple	Tandy	IBM	IBM	IBM
Tandy	Apple	Apple	Apple	Apple
HP	IBM	Commodore	Commodore	Commodore
IBM	HP	Tandy	HP	HP
Tektronix	Commodore	Osborne	Tandy	DEC
Commodore	Xerox	Convergent	Victor	Tandy
North Star	Zenith	NEC	DEC	Compaq
Intertec	North Star	HP	Osborne	(Others too
Exidy Systems	Cromemco	Xerox	Kaypro	close to
Atari	Atari	Atari	Zenith	call)

As the chart above shows, IBM, Apple and Commodore are solidly entrenched in the top three spots. Interestingly, in 1983 five of the top nine vendors were primarily vendors of 8-bit systems, and the transition to 16-bit systems won't be completed even in 1984. The resiliency of the 8-bit marketplace suggests that 16-bit machines will be selling well for many years to come.

With relatively little new start-up activity, and stepped-up casualty rates, 1984 has a chance to be the first year when fewer companies enter the PC business than leave it. But a new wave of start-ups can be expected once multi-tasking operating systems emerge. Of the 130 manufacturers tracked by IDC, EDP/IR estimates that about 25 have a shot at long term PC viability. In 1983, the top ten vendors accounted for 75% of total PC shipment value.

NUMBER OF U.S. PC VENDORS



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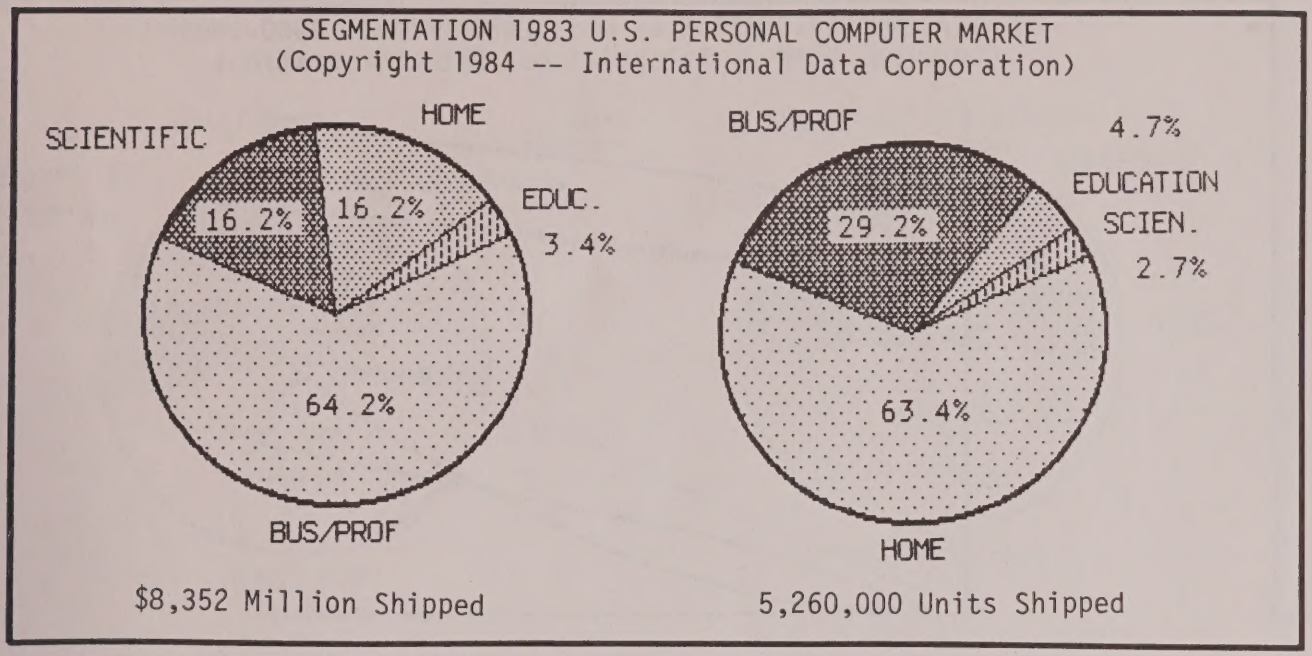

Of IBM and Apple

By boldly expanding its production capacity, IBM has dimmed the party lights for many of its competitors. Whereas IDC estimates that IBM shipped some 675,000 PCs in 1983, it expects this figure to reach about 1.7 million units worldwide in 1984. The giant has now succeeded in making PC availability largely a non-issue, forcing competitors to compete on price and features.

During the last twelve months, IBM's focus has shifted toward the needs of its installed base. The XT 370, 3270 PC, and 3270 PC GX appeal only to customers who want access to IBM's mainframes. Of these products, the 3270 PC shows the most promise, both for its windowing and its direct connection to the 3274 controller. On the software front, IBM continues to slowly improve its document transfer and terminal emulation capabilities.

EDP/IR expects that IBM will continue along this path. As the VM operating system catches on, a more powerful version of the XT/370 will be needed. Additionally, the great success of the System/36 may create a market for single user or small multiuser configurations. With the right software, a 286-based system could assume many of the tasks for which the Series 1 is used.

As for the retail market, the big question is what sort of follow-on products IBM will announce. The 286-based systems (popcorn) are expected to be significantly more expensive, but whether IBM will bring out a 188, 186 or faster 8088 system remains to be seen. EDP/IR does not see IBM's Unix PC (PCIX) as a serious product at this time. The new PC/jr with more memory and a normal keyboard is better positioned for business use, but still lacks a second drive.

Considering that software availability is still a serious problem, Apple's MacIntosh has done remarkably well, and supplies are still a little tight. But much of the best software, such as from Lotus, will not be available until the so-called Fat-MaC arrives next year with its 256K chips and 512KB memory. Apple II sales remain strong, and the enthusiasm over MacIntosh (along with some hefty price cuts) has rejuvenated the Lisa. But rivaling IBM remains tough since the cream of the software world still looks to IBM first.

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WORKSTATION PENETRATION OF U.S. LABOR FORCE, 1980-1989
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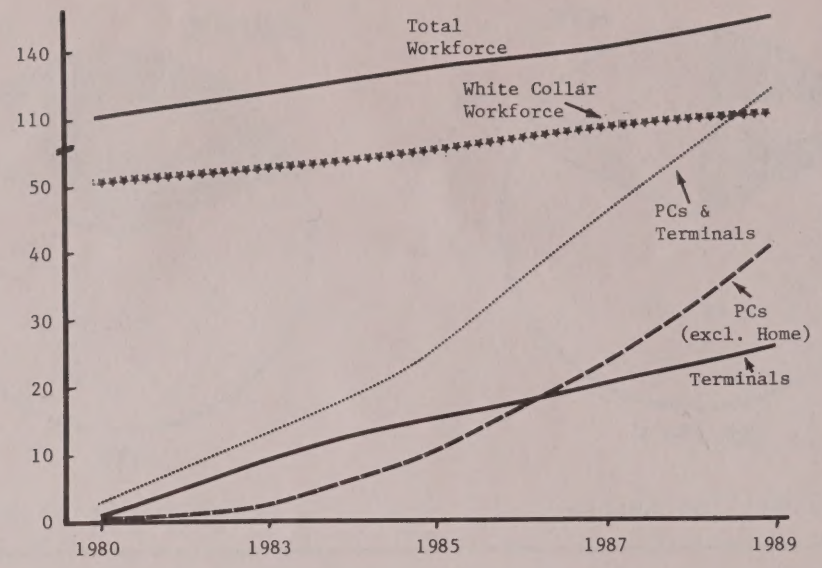

The chart above contrasts IDC's PC and terminal forecasts with both the white collar and total labor force projections of the U.S. Department of Labor. Although the total number of workstations is forecasted to approximately equal the number of white collar workers, saturation of the white collar market will not be complete since many devices will be in non-white collar environments, such as factories, and many office workers will have several devices.

The uncertainty variable in these calculations is as much the retirement rate as the shipment forecast. The numbers above are based on a six-year PC system life cycle. IDC's PC figures (see red page) don't include retirements. Historically, terminals have had average lifespans in the 8-10 year range.

In the last 12 months the PC and terminal markets have really begun to merge. In addition to IBM's 3270 PC, 3270-compatible terminal vendors such as Telex, ITT, and Lee Data have added personal computing options to their terminal lines. But there will continue to be a large sector of the data processing world that does not need personal computing capability, and from a security point of view relatively dumb terminals are sometimes preferable.

The lessons of the 3270 terminal market seem quite applicable to the current PC compatible rush. Vendors who can't handle a 20% price cut on a three year old product shouldn't be in the market. Profitability will swing to the rhythms of IBM's product cycles, and any major foulup threatens to be fatal. Although it may seem like AT&T, ITT, and the Japanese have an edge in the PC compatible world, the presence of giants such as AT&T, Memorex, Raytheon, and ITT has not prevented Telex and Lee Data from prospering in the 3270 business.

The home market is a different story altogether. EDP/IR expects that many of the systems shipped to date will be retired relatively quickly. In the long term, usable home systems will require considerably more power than the devices available in today's market, but these systems and their applications have yet to emerge. Given the current dearth of vendors, IDC expects shipments of home systems to be relatively flat until the 1988-89 period. The wild card in this market is Jack Tramiel's exit from Commodore, and subsequent takeover of Atari.

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CHANNELS OF DISTRIBUTION, 1983 U.S. PERSONAL COMPUTER SHIPMENTS
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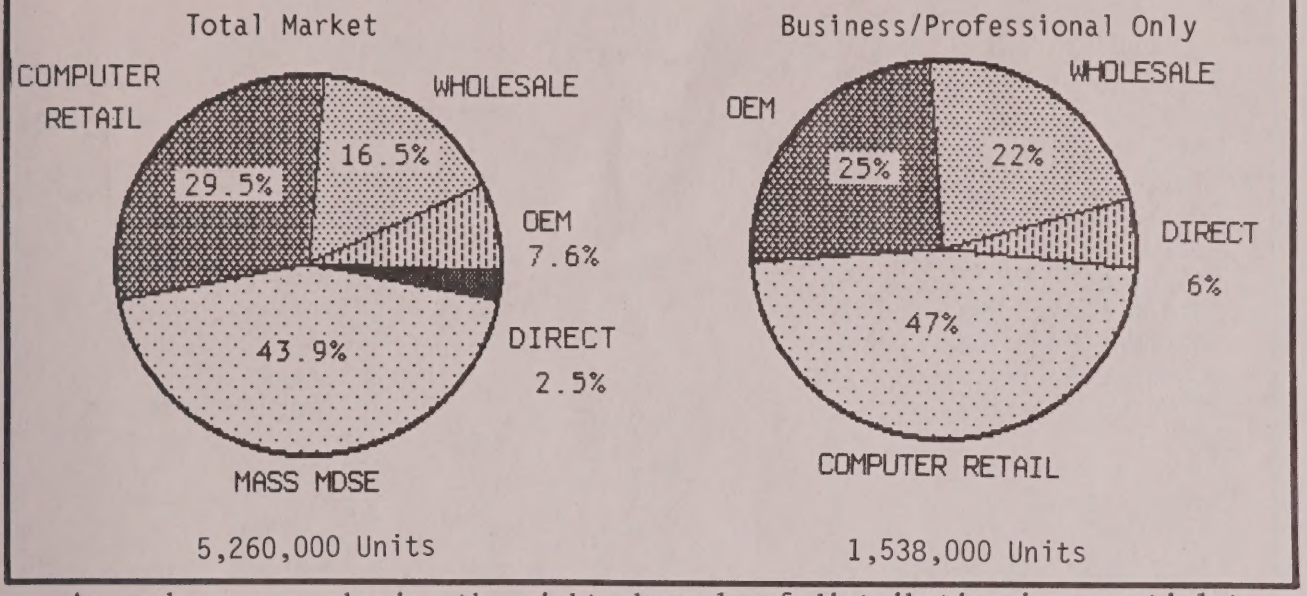

As much as ever, having the right channels of distribution is essential to building significant PC shipment volumes. IDC estimates that as much as 30% of all PC revenues may accrue to the distribution channel. There are now more than 3,000 stores in the U.S., with Computerland, Entre, Software Center International, Micro Age, Sears, Compushop and Genra the market leaders.

Other than IBM, most of the large computer vendors seem to be focusing on the needs of their traditional markets. DEC is increasingly looking at OEMs and other value-added outlets. Data General, Sperry, NCR, Honeywell, Wang and Burroughs are doing much of their business within their installed base, and none are getting broad-based retail exposure. Of the major non-IBM hardware vendors, only HP is aggressively pursuing the retail PC business.

AT&T and ITT have had success in getting dealer shelf space despite their relatively late entries into the IBM-compatible arena. Whatever success these two have is likely to come out of the hides of the Columbias, Coronas, and Eagles of the world. Compaq remains a cut above the rest. Its reputation for listening to its dealers was reinforced with its recent 8086-based Model 4. Four different systems can be built with one chassis, an inventory blessing.

The Japanese are still finding it very difficult to find sufficient retail outlets. IDC estimates that the Japanese vendors -- mostly NEC and Epson -- had a total of 1.3% of the 5.2 million units shipped in the U.S. It is doubtful whether their position will improve significantly in 1984.

IDC expects several changes in the distribution channels over the next five years. The retail and OEM segments will enjoy a slight increase in share at the expense of wholesalers and mass merchandisers. Some manufacturers don't like wholesalers because it becomes difficult for the manufacturer to insist on quality dealers. Many retailers would prefer to buy from the manufacturer rather than pay the wholesaler's mark up. Additionally, as the larger chains gain share, there will be less need for wholesaler services. (Wholesalers are often called distributors.) Direct sales by the manufacturer accounted for only 4% of the value of 1983 U.S. shipments.

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REVENUES OF INDEPENDENT PERSONAL COMPUTER SOFTWARE FIRMS
(Copyright 1984 -- International Data Corporation)

Vendor	1983 Rev. ($M)	1982 Rev. ($M)	%	Top Sellers
MicroPro	65	26	150%	Word Star
Microsoft	56	32	75	MS-DOS, Xenix Multiplan
Lotus	53	--		1-2-3
Visicorp	50	35	40	Visicalc
Digital Research	45	22	105	CP/M, Languages
Ashton Tate	40	14	186	dBase II, Friday
Peachtree (MSA)	22	9	144	Peachtext
Sorcim (Comp. Asso.)	12	4	200	Supercalc
Software Publishing	11	4	175	PFS
Software Arts	10	6	67	TK Solver
Info. Unlt'd Soft.	9	4.5	67	Office Productivity
BPI	7	4.5	56	Accounting
Micro Focus	7	4.5	56	CIS Cobol
Open Systems	6	4	50	Accounting
Real World Corp.	5	4	25	Accounting
Structured Sys. Group	5	4	25	Accounting
Subtotal	403	178	126	
Other	477	322	48	
Total	880	500	76	

In 1983, the micro software industry crashed through the $1 billion mark. IDC forecasts that total sales by independents and hardware manufacturers will grow at 48% per year through 1989, reaching a heady $15 billion. By that time, software will account for 27% of the value of PC sales, up from 12% in 1983. Despite this growth, however, PC software sales will remain well below the $39 billion in software expected to be sold for mini and mainframe systems in 1989.

The PC software world is at least as chaotic as the hardware side of the market, and no less dangerous. Among the great debates are: Unix vs. DOS; mice and windows vs. menus and commands; integrated vs. discrete applications; independents vs. manufacturers; ease of operation vs. ease of learning; and IBM vs. Apple. Many of these issues will be clarified in the next two years.

1984 may be remembered as the year the software business got nasty. Inflated vendor claims and heavy advertising have combined with layoffs -- Visicorp, Micropro, Condor Computer, Software Arts, and Ask Micro -- and falling earnings to shake both user and venture capital confidence. Additionally, the industry (other than Microsoft) has been largely unable to develop successful follow on products. On the bright side, usable industry-specific software is emerging.

EDP/IR expects that IBM will soon implement both mice and windows (the two are almost inseparable); it will also add multi-user and multi-tasking on its upcoming 286-based system. But whether these systems will run Xenix (EDP/IR's pick), System V or some IBM-developed variant remains to be seen.

IBM is developing its own integrated software package, but whether these efforts will ever see the light of day is a matter of conjecture. In the single user environment, concurrent DOS may allow Digital Research to regain some of its one-time operating system preeminence. PC operating systems remain an area ripe with hush-hush code names such as crystal (DRI) and glass (IBM).

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PERSONAL COMPUTER MARKET -- U.S.-Based Manufacturers[a]

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1977	51,000	215,000	396	2.0
1978	177,000	392,000	768	2.8
1979	289,000	681,000	1,038	3.8
1980	440,000	1,121,000	1,981	5.8
1981	845,000	1,966,000	2,973	8.7
1982	3,792,000	5,758,000	5,398	14.2
1983	7,068,000	12,826,000	11,555	25.7
1984	10,281,000	23,107,000	16,770	42.4
1985	13,529,000	36,636,000	22,745	65.3
1986	15,914,000	52,550,000	28,969	94.2
1987	18,862,000	71,412,000	36,754	130.9
1988	23,981,000	95,393,000	45,570	176.6
1989	30,052,000	125,458,000	56,603	233.5
		UNITED STATES		
1977	32,000	101,000	230	0.9
1978	131,000	232,000	455	1.4
1979	183,000	415,000	648	2.0
1980	308,000	723,000	1,213	3.2
1981	611,000	1,334,000	2,095	5.3
1982	2,934,000	4,268,000	3,859	9.2
1983	5,260,000	9,528,000	8,352	17.5
1984	7,567,000	17,095,000	12,206	29.7
1985	9,641,000	26,736,000	16,435	46.2
1986	10,616,000	37,352,000	20,377	66.6
1987	11,857,000	49,209,000	25,064	91.6
1988	14,990,000	64,199,000	30,636	122.3
1989	18,691,000	82,890,000	37,407	160.0
		INTERNATIONAL		
1977	19,000	114,000	166	1.1
1978	46,000	160,000	313	1.4
1979	106,000	266,000	390	1.8
1980	132,000	398,000	768	2.6
1981	234,000	632,000	878	3.4
1982	858,000	1,490,000	1,539	5.0
1983	1,808,000	3,298,000	3,203	8.2
1984	2,714,000	6,012,000	4,564	12.7
1985	3,888,000	9,900,000	6,310	19.1
1986	5,298,000	15,198,000	8,592	27.6
1987	7,005,000	22,203,000	11,690	39.3
1988	8,991,000	31,194,000	14,934	54.3
1989	11,361,000	42,555,000	19,196	73.5

[a] International Manufacturers with U.S.-based sales offices are counted in U.S. totals, but not international.

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CENSUS OF TOP TEN PERSONAL COMPUTER VENDORS, BY DOLLAR VALUE OF INSTALLED BASE (as of 12/31/83)

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE IN DOLLARS BASIC	PURCHASE PRICE IN DOLLARS AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	CUMULATIVE NUMBER SHIPPED OUTSIDE U.S.	CUMULATIVE NUMBER SHIPPED	SHIPMENTS NEXT 12 MONTHS
Apple	Apple II, IIe	6802		7,330	2,500	05/77	985,000	335,000	1,320,000	405,000
	Apple III	6502		4,240	6,000	11/80	44,000	16,000	60,000	X
	Lisa	68000		10,000	7,500	--/83	15,500	4,500	20,000	X
	Lisa II	68000		3,495	4,500	--/84	0	0	0	125,000
	Macintosh	68000		2,495	2,495	--/84	0	0	0	425,000
	Apple IIc	65C02		1,295	1,295	--/84	0	0	0	NA
						TOTAL	1,044,500	355,500	1,400,000	
Commodore	64	6510		400	400	08/82	750,000	500,000	1,250,000	2,500,000
	Super Pet	6502B		1,995	1,995	07/81	45,000	54,000	100,000	30,000
	PET/CBM	6502		995	1,295	10/77	220,000	290,000	515,000	96,000
	VIC/20	6502A		150	150	06/81	1,090,000	900,000	2,000,000	500,000
	128	6510		795	795	10/83	10,000	10,000	20,000	250,000
	Executive 64	6510		1,000	1,000	02/83	10,000	10,000	20,000	300,000
						TOTAL	2,125,000	1,764,000	3,889,000	3,676,000
Digital Equipment Corp.	Mini MINC	LSI-11		9,900	11,000	10/79	5,850	820	6,670	NA
	325, 350	F11		4,495	4,495	--/82	9,950	2,300	12,250	10,000
	Rainbow 100	Z80, 8088		3,245	3,245	--/82	57,050	14,100	71,150	95,000
	VT100 (18X Kit)	Z80		5,000	5,000	01/82	4,500	500	5,000	NA
	Decmate II	6120		3,740	3,790	01/83	18,000	4,000	22,000	25,000
	Data System 150	LSI-11		10,900	15,000	03/79	1,200	900	2,100	X
						TOTAL	96,550	22,620	119,170	
Hewlett-Packard	9835	HP		9,000	13,200	12/78	3,620	4,580	8,200	NA
	9825	HP		5,900	10,900	01/76	13,015	22,285	35,300	2,000
	9845	HP		12,000	28,800	11/77	7,500	11,000	18,500	1,000
	9830	HP		4,900	16,500	11/72	5,000	5,000	10,000	X
	9816A/S	68000		3,650	5,000	11/82	6,400	9,600	16,000	14,000
	9826A/S	68000		9,000	11,803	06/81	4,400	6,600	11,000	2,500
	9836A/S	68000		12,000	14,500	01/81	6,460	8,190	14,650	7,000
	125	Z80		4,950	6,200	09/82	10,650	3,500	14,150	4,000
	83	HP		2,250	2,550	01/81	2,500	2,500	5,000	X
	85	HP		2,750	3,550	01/80	34,600	36,400	71,000	12,000
	86	HP		1,795	3,700	07/82	10,000	11,500	21,500	15,000
	87	HP		2,495	4,790	03/82	4,400	4,500	8,900	X
	120	Z80		2,775	2,775	12/82	4,550	4,000	8,550	5,000
	150	8086		3,995	3,995	10/83	5,000	5,000	10,000	100,000
	220	68000		3,000	5,000	04/83	1,500	1,000	2,500	10,000
	110	80C86		2,995	2,995	06/84	0	0	0	NA
						TOTAL	119,595	135,655	255,250	
IBM	5150 (PC)	8088		1,565	4,500	10/81	774,900	80,100	855,000	1,000,000
	Portable	8088		2,795	2,795	--/84	0	0	0	100,000
	PC 3270	8087, 68000		6,720	8,995	--/84	0	0	0	NA
	XT	8088		4,995	7,500	05/83	40,000	5,000	45,000	300,000
	XT370	8088, 68000		8,795	11,300	--/84	0	0	0	10,000
	PC Jr	8088		700	1,200	--/84	0	0	0	250,000
	5100	IBM		6,300	13,000	11/75	4,300	1,000	5,300	X
	5110	IBM		9,900	17,000	02/78	13,500	2,600	16,100	X
	5120	IBM		9,340	15,000	02/80	6,500	1,600	8,100	X
	Sys/23 Datamaster	8085		9,830	12,530	07/81	23,000	8,000	31,000	NA
	3741/3-4	IBM		4,000	4,000	NA	2,600	31,700	34,300	X
	9000 Series	68000		10,000	10,000	--/82	1,000	0	1,000	X
						TOTAL	865,800	130,000	995,800	
Kaypro Corp.	Kapro II, 10	Z80		1,795	1,795	03/82	100,000	20,000	120,000	NA
	Model 4 Plus 88	Z80		1,995	1,995	--/84	0	0	0	NA
						TOTAL	100,000	20,000	120,000	
Osborne Computer Co.	Osborne 1	Z80		1,495	1,795	07/81	120,000	46,000	166,000	X
	Executive	Z80		2,500	2,500	--/83	30,000	10,000	40,000	X
	PC	8086		3,000	3,000	--/84	0	0	0	NA
						TOTAL	150,000	56,000	206,000	
Sinclair (U.S. Only)	ZX/80,81,1000	Z80-A		100	150	01/82	1,100,000	-	1,100,000	300,000
	TS2068	Z80-A		179	179	08/83	50,000	-	50,000	50,000
						TOTAL	1,150,000	-	1,150,000	350,000
Tandy/Radio Shack	TRS-80/1	Z80		499	1,000	09/77	247,500	27,500	275,000	X
	TRS-80/II, IV	Z80		700	2,000	09/81	204,000	39,000	243,000	NA
	TRS-80/III	Z80		3,450	2,000	07/79	102,000	14,000	116,000	X
	TRS-80/16	68000		4,999	9,000	--/82	28,700	3,300	32,000	NA
	TRS-80 Color	6809		275	399	12/83	190,000	47,000	237,000	NA
	TRS 80-100	80C85		799	850	--/83	83,000	12,000	95,000	100,000
						TOTAL	855,200	142,800	998,000	
Texas Instruments	PRO	8088		1,600	3,900	08/83	35,000	0	35,000	NA
	742,770,771	NA		5,745	10,000	--/77	11,050	30,500	41,550	X
	99/4	TI9900		650	1,000	11/79	19,850	150	20,000	X
	99/4A	TI9900		150	150	07/81	1,250,150	29,850	1,280,000	X
						TOTAL	1,316,050	60,500	1,376,550	

The complete personal computer census will be available in the deluxe addition of EDP/IR's Review and Forecast special report. The report will be available this Fall for $995. Call 617-872-8200 and ask for Mary Trayte.

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REVIEW & FORECAST
Part I

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

DAVID MOSCHELLA, EDITOR AUG. 15, 1984 ● VOL.20, NO.8 P.J. MCGOVERN, PUBLISHER

IDC INTERNATIONAL DATA CORPORATION

VENDOR TURMOIL MOUNTS IN PERSONAL COMPUTER MARKET, BUT WORLDWIDE SHIPMENT VALUE TO GROW 30% PER YEAR THROUGH 1989

The PC headlines are full of pessimism. The easy sales have been made; supply is outstripping demand; margins are under fire; strategies are dubious; applications are unimaginative, and layoffs and bankruptcies are becoming commonplace. Who needs a PC anyway?

The numbers, however, tell a very different story. International Data Corporation expects that in the next six years, 73 million personal computers will be shipped in the U.S. alone. The dollar value of U.S. shipments will grow at 28.4% per year, from $8.3 billion in 1983 to a whopping $37.4 billion in 1989. U.S. vendor shipments to international markets will grow even faster, from $3.2 billion in 1983 to $19.2 billion in 1989, a compound growth rate of 34.8%.

Despite all the clamor, IBM is not devouring the entire market. IDC estimates that in 1984 IBM will grab some 35% of the $16.8 billion of worldwide PC shipments, up from 28% in 1983. As long as IBM's market share stays in the 30% to 40% range, there will be room for others to thrive, but in a market with 130 vendors, many additional failures are certain. Some key points:

- Demographics. At the end of 1983, outside of the home there was about one PC or terminal for every ten U.S. workers. Less than 20% of the white collar market has been reached.

- IBM strategy. With its announcement of the 3270 PC, the XT 370 and its new local area network, IBM has increased its emphasis on selling to its large system base.

- IBM compatibility. The success of Compaq has encouraged a move toward strict IBM compatibility by Wang, NCR and others. AT&T, ITT and the Japanese will appeal to PC retailers looking for stability, although Compaq has as good a dealer reputation as anyone.

- Apple power. With MacIntosh, Apple II and Lisa all doing well, Apple will ship nearly one million machines in 1984. 1985 looks good too.

- New vendors. A new generation of chips -- i.e., 256K RAMS and the 286, 68020, and 32032 MPUs -- and software ensures many new players.

EDP Industry Report is published in annual volumes of twenty-four issues each by International Data Corporation, Post Office Box 955, Five Speen Street, Framingham, MA 01701. Entire contents © 1984 by International Data Corporation. **Editor,** David Moschella, **Director of Publications,** Molly Upton; **Census Editors,** Lloyd Cohen; **Contributing Editors,** Marcia Brooks, Aaron Goldberg, Jack Hart, Ann Morley, William F. Zachmann; **Circulation Manager,** Mary M. Trayte, Patrick J. McGovern, Chairman, International Data Group; Peter Rowell, President, International Data Corporation. Editorial ideas and information are researched and formulated by the editorial staff. Information and opinions in each issue are based on the best information available, but their accuracy and completeness cannot be guaranteed. **Subscriptions:** One year $365, two years, $645. Single copies priced as indicated on inside pages. Prices for multiple copies on request. Reproduction without written permission is completely forbidden. Telex 95-1168. Telephone **617/872-8200.**

1983 WORLDWIDE PC SHIPMENTS -- VALUE (Left) & UNITS (Right)
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Vendor	Value ($M)	Percent	Vendor	Units	Percent
IBM	$3,230	28.0%	Commodore	2,390,000	33.7%
Apple	1,595	13.8	Texas Inst.	815,000	11.5
Commodore	881	7.6	Apple	790,000	11.2
HP	674	5.8	IBM	676,500	9.6
Tandy	638	5.5	Sinclair	550,000	7.8
Victor	440	3.8	Tandy	393,000	5.6
DEC	375	3.2	Atari	250,000	3.5
Osborne	279	2.4	Osborne	160,000	2.3
Kaypro	203	1.8	Kaypro	113,000	1.6
Zenith	180	1.6	DEC	105,500	1.5
Others	3,060	26.5	Others	825,000	11.7
Total	11,555		Total	7,068,000	

Note: Value of shipments reflects retail pricing. Not all of the value goes to the manufacturer.

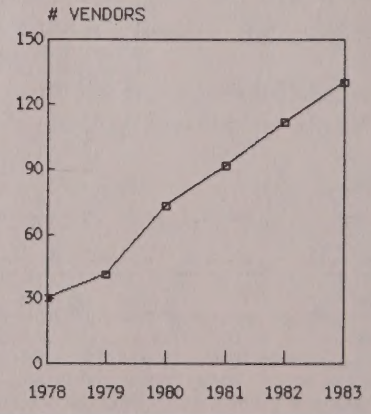
LEADING PC VENDORS, DOLLAR VALUE OF SHIPMENTS, 1980-1984
(Copyright 1984 -- International Data Corporation)

1980	1981	1982	1983	1984 (est.)
Apple	Tandy	IBM	IBM	IBM
Tandy	Apple	Apple	Apple	Apple
HP	IBM	Commodore	Commodore	Commodore
IBM	HP	Tandy	HP	HP
Tektronix	Commodore	Osborne	Tandy	DEC
Commodore	Xerox	Convergent	Victor	Tandy
North Star	Zenith	NEC	DEC	Compaq
Intertec	North Star	HP	Osborne	(Others too
Exidy Systems	Cromemco	Xerox	Kaypro	close to
Atari	Atari	Atari	Zenith	call)

As the chart above shows, IBM, Apple and Commodore are solidly entrenched in the top three spots. Interestingly, in 1983 five of the top nine vendors were primarily vendors of 8-bit systems, and the transition to 16-bit systems won't be completed even in 1984. The resiliency of the 8-bit marketplace suggests that 16-bit machines will be selling well for many years to come.

With relatively little new start-up activity, and stepped-up casualty rates, 1984 has a chance to be the first year when fewer companies enter the PC business than leave it. But a new wave of start-ups can be expected once multi-tasking operating systems emerge. Of the 130 manufacturers tracked by IDC, EDP/IR estimates that about 25 have a shot at long term PC viability. In 1983, the top ten vendors accounted for 75% of total PC shipment value.

NUMBER OF U.S. PC VENDORS



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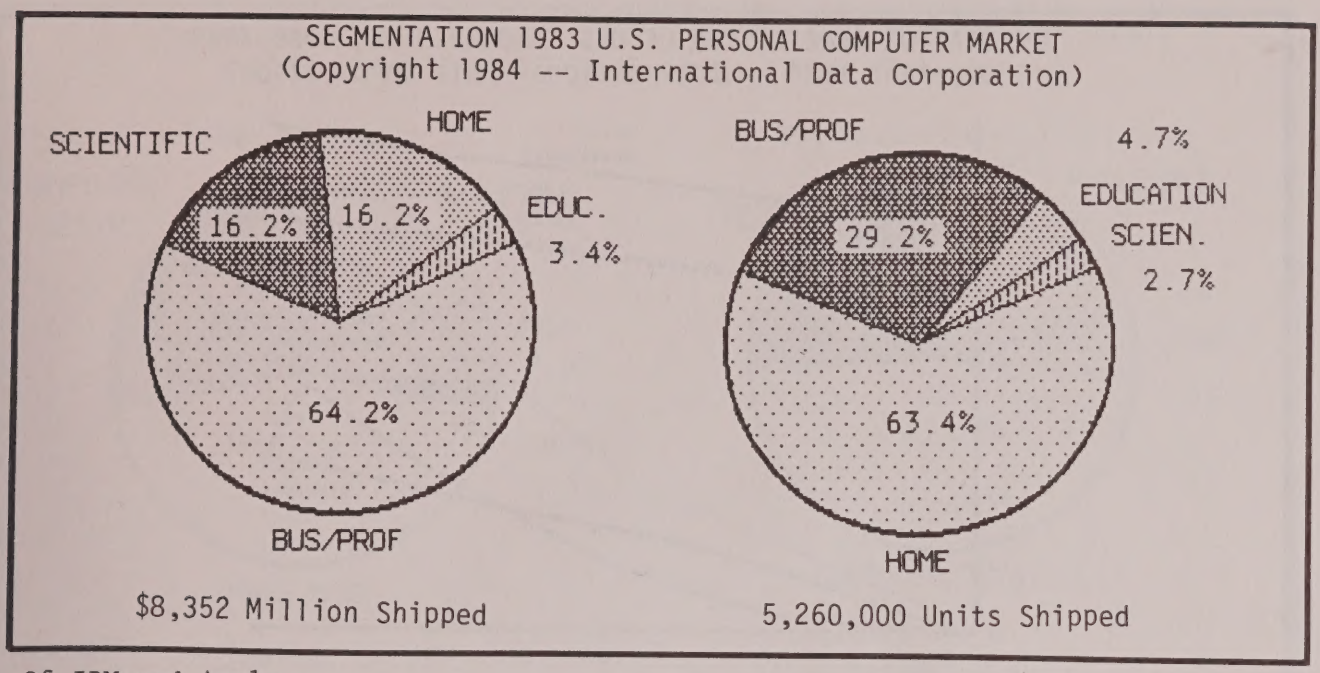

Of IBM and Apple

By boldly expanding its production capacity, IBM has dimmed the party lights for many of its competitors. Whereas IDC estimates that IBM shipped some 675,000 PCs in 1983, it expects this figure to reach about 1.7 million units worldwide in 1984. The giant has now succeeded in making PC availability largely a non-issue, forcing competitors to compete on price and features.

During the last twelve months, IBM's focus has shifted toward the needs of its installed base. The XT 370, 3270 PC, and 3270 PC GX appeal only to customers who want access to IBM's mainframes. Of these products, the 3270 PC shows the most promise, both for its windowing and its direct connection to the 3274 controller. On the software front, IBM continues to slowly improve its document transfer and terminal emulation capabilities.

EDP/IR expects that IBM will continue along this path. As the VM operating system catches on, a more powerful version of the XT/370 will be needed. Additionally, the great success of the System/36 may create a market for single user or small multiuser configurations. With the right software, a 286-based system could assume many of the tasks for which the Series 1 is used.

As for the retail market, the big question is what sort of follow-on products IBM will announce. The 286-based systems (popcorn) are expected to be significantly more expensive, but whether IBM will bring out a 188, 186 or faster 8088 system remains to be seen. EDP/IR does not see IBM's Unix PC (PCIX) as a serious product at this time. The new PC/jr with more memory and a normal keyboard is better positioned for business use, but still lacks a second drive.

Considering that software availability is still a serious problem, Apple's MacIntosh has done remarkably well, and supplies are still a little tight. But much of the best software, such as from Lotus, will not be available until the so-called Fat-MaC arrives next year with its 256K chips and 512KB memory. Apple II sales remain strong, and the enthusiasm over MacIntosh (along with some hefty price cuts) has rejuvenated the Lisa. But rivaling IBM remains tough since the cream of the software world still looks to IBM first.

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WORKSTATION PENETRATION OF U.S. LABOR FORCE, 1980-1989
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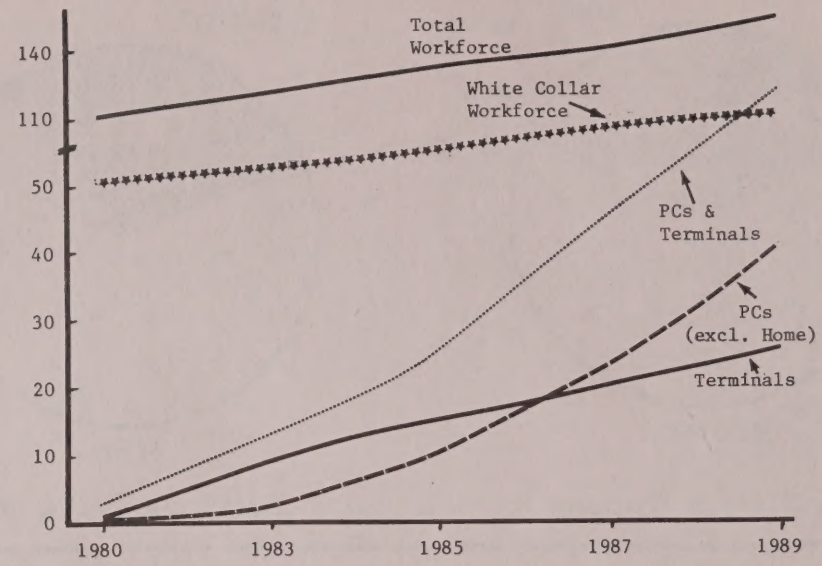

The chart above contrasts IDC's PC and terminal forecasts with both the white collar and total labor force projections of the U.S. Department of Labor. Although the total number of workstations is forecasted to approximately equal the number of white collar workers, saturation of the white collar market will not be complete since many devices will be in non-white collar environments, such as factories, and many office workers will have several devices.

The uncertainty variable in these calculations is as much the retirement rate as the shipment forecast. The numbers above are based on a six-year PC system life cycle. IDC's PC figures (see red page) don't include retirements. Historically, terminals have had average lifespans in the 8-10 year range.

In the last 12 months the PC and terminal markets have really begun to merge. In addition to IBM's 3270 PC, 3270-compatible terminal vendors such as Telex, ITT, and Lee Data have added personal computing options to their terminal lines. But there will continue to be a large sector of the data processing world that does not need personal computing capability, and from a security point of view relatively dumb terminals are sometimes preferable.

The lessons of the 3270 terminal market seem quite applicable to the current PC compatible rush. Vendors who can't handle a 20% price cut on a three year old product shouldn't be in the market. Profitability will swing to the rhythms of IBM's product cycles, and any major foulup threatens to be fatal. Although it may seem like AT&T, ITT, and the Japanese have an edge in the PC compatible world, the presence of giants such as AT&T, Memorex, Raytheon, and ITT has not prevented Telex and Lee Data from prospering in the 3270 business.

The home market is a different story altogether. EDP/IR expects that many of the systems shipped to date will be retired relatively quickly. In the long term, usable home systems will require considerably more power than the devices available in today's market, but these systems and their applications have yet to emerge. Given the current dearth of vendors, IDC expects shipments of home systems to be relatively flat until the 1988-89 period. The wild card in this market is Jack Tramiel's exit from Commodore, and subsequent takeover of Atari.

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CHANNELS OF DISTRIBUTION, 1983 U.S. PERSONAL COMPUTER SHIPMENTS
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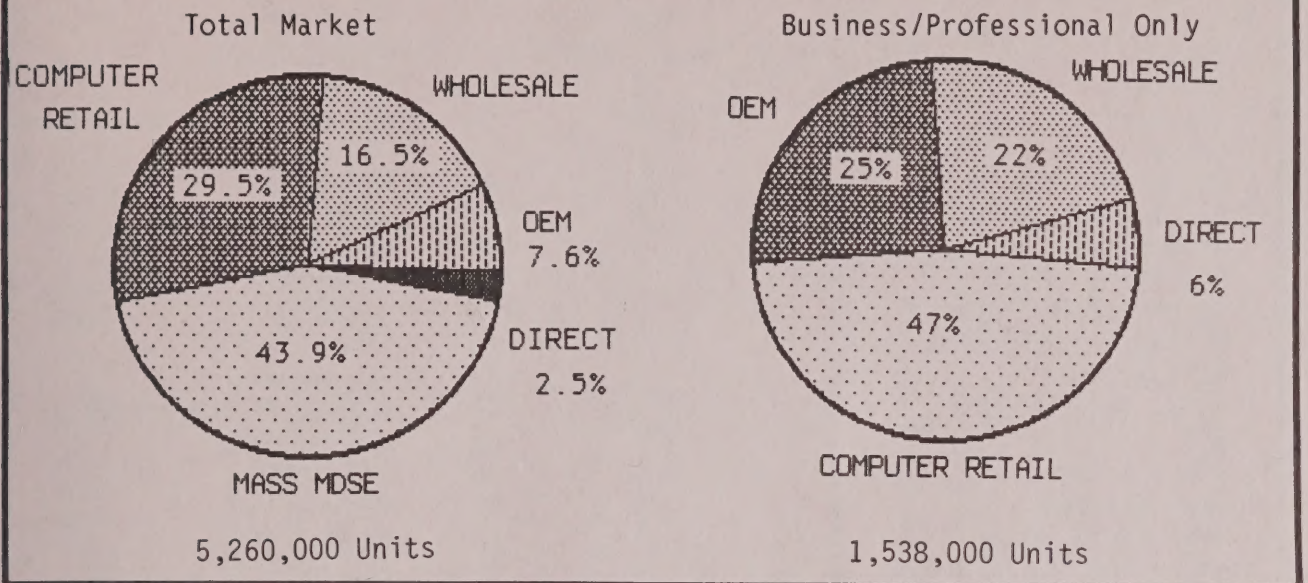

As much as ever, having the right channels of distribution is essential to building significant PC shipment volumes. IDC estimates that as much as 30% of all PC revenues may accrue to the distribution channel. There are now more than 3,000 stores in the U.S., with Computerland, Entre, Software Center International, Micro Age, Sears, Compushop and Genra the market leaders.

Other than IBM, most of the large computer vendors seem to be focusing on the needs of their traditional markets. DEC is increasingly looking at OEMs and other value-added outlets. Data General, Sperry, NCR, Honeywell, Wang and Burroughs are doing much of their business within their installed base, and none are getting broad-based retail exposure. Of the major non-IBM hardware vendors, only HP is aggressively pursuing the retail PC business.

AT&T and ITT have had success in getting dealer shelf space despite their relatively late entries into the IBM-compatible arena. Whatever success these two have is likely to come out of the hides of the Columbias, Coronas, and Eagles of the world. Compaq remains a cut above the rest. Its reputation for listening to its dealers was reinforced with its recent 8086-based Model 4. Four different systems can be built with one chassis, an inventory blessing.

The Japanese are still finding it very difficult to find sufficient retail outlets. IDC estimates that the Japanese vendors -- mostly NEC and Epson -- had a total of 1.3% of the 5.2 million units shipped in the U.S. It is doubtful whether their position will improve significantly in 1984.

IDC expects several changes in the distribution channels over the next five years. The retail and OEM segments will enjoy a slight increase in share at the expense of wholesalers and mass merchandisers. Some manufacturers don't like wholesalers because it becomes difficult for the manufacturer to insist on quality dealers. Many retailers would prefer to buy from the manufacturer rather than pay the wholesaler's mark up. Additionally, as the larger chains gain share, there will be less need for wholesaler services. (Wholesalers are often called distributors.) Direct sales by the manufacturer accounted for only 4% of the value of 1983 U.S. shipments.

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REVENUES OF INDEPENDENT PERSONAL COMPUTER SOFTWARE FIRMS
(Copyright 1984 -- International Data Corporation)

Vendor	1983 Rev. ($M)	1982 Rev. ($M)	%	Top Sellers
MicroPro	65	26	150%	Word Star
Microsoft	56	32	75	MS-DOS, Xenix Multiplan
Lotus	53	--		1-2-3
Visicorp	50	35	40	Visicalc
Digital Research	45	22	105	CP/M, Languages
Ashton Tate	40	14	186	dBase II, Friday
Peachtree (MSA)	22	9	144	Peachtext
Sorcim (Comp. Asso.)	12	4	200	Supercalc
Software Publishing	11	4	175	PFS
Software Arts	10	6	67	TK Solver
Info. Unlt'd Soft.	9	4.5	67	Office Productivity
BPI	7	4.5	56	Accounting
Micro Focus	7	4.5	56	CIS Cobol
Open Systems	6	4	50	Accounting
Real World Corp.	5	4	25	Accounting
Structured Sys. Group	5	4	25	Accounting
Subtotal	403	178	126	
Other	477	322	48	
Total	880	500	76	

In 1983, the micro software industry crashed through the $1 billion mark. IDC forecasts that total sales by independents and hardware manufacturers will grow at 48% per year through 1989, reaching a heady $15 billion. By that time, software will account for 27% of the value of PC sales, up from 12% in 1983. Despite this growth, however, PC software sales will remain well below the $39 billion in software expected to be sold for mini and mainframe systems in 1989.

The PC software world is at leàst as chaotic as the hardware side of the market, and no less dangerous. Among the great debates are: Unix vs. DOS; mice and windows vs. menus and commands; integrated vs. discrete applications; independents vs. manufacturers; ease of operation vs. ease of learning; and IBM vs. Apple. Many of these issues will be clarified in the next two years.

1984 may be remembered as the year the software business got nasty. Inflated vendor claims and heavy advertising have combined with layoffs -- Visicorp, Micropro, Condor Computer, Software Arts, and Ask Micro -- and falling earnings to shake both user and venture capital confidence. Additionally, the industry (other than Microsoft) has been largely unable to develop successful follow on products. On the bright side, usable industry-specific software is emerging.

EDP/IR expects that IBM will soon implement both mice and windows (the two are almost inseparable); it will also add multi-user and multi-tasking on its upcoming 286-based system. But whether these systems will run Xenix (EDP/IR's pick), System V or some IBM-developed variant remains to be seen.

IBM is developing its own integrated software package, but whether these efforts will ever see the light of day is a matter of conjecture. In the single user environment, concurrent DOS may allow Digital Research to regain some of its one-time operating system preeminence. PC operating systems remain an area ripe with hush-hush code names such as crystal (DRI) and glass (IBM).

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PERSONAL COMPUTER MARKET -- U.S.-Based Manufacturers[a]

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1977	51,000	215,000	396	2.0
1978	177,000	392,000	768	2.8
1979	289,000	681,000	1,038	3.8
1980	440,000	1,121,000	1,981	5.8
1981	845,000	1,966,000	2,973	8.7
1982	3,792,000	5,758,000	5,398	14.2
1983	7,068,000	12,826,000	11,555	25.7
1984	10,281,000	23,107,000	16,770	42.4
1985	13,529,000	36,636,000	22,745	65.3
1986	15,914,000	52,550,000	28,969	94.2
1987	18,862,000	71,412,000	36,754	130.9
1988	23,981,000	95,393,000	45,570	176.6
1989	30,052,000	125,458,000	56,603	233.5
		UNITED STATES		
1977	32,000	101,000	230	0.9
1978	131,000	232,000	455	1.4
1979	183,000	415,000	648	2.0
1980	308,000	723,000	1,213	3.2
1981	611,000	1,334,000	2,095	5.3
1982	2,934,000	4,268,000	3,859	9.2
1983	5,260,000	9,528,000	8,352	17.5
1984	7,567,000	17,095,000	12,206	29.7
1985	9,641,000	26,736,000	16,435	46.2
1986	10,616,000	37,352,000	20,377	66.6
1987	11,857,000	49,209,000	25,064	91.6
1988	14,990,000	64,199,000	30,636	122.3
1989	18,691,000	82,890,000	37,407	160.0
		INTERNATIONAL		
1977	19,000	114,000	166	1.1
1978	46,000	160,000	313	1.4
1979	106,000	266,000	390	1.8
1980	132,000	398,000	768	2.6
1981	234,000	632,000	878	3.4
1982	858,000	1,490,000	1,539	5.0
1983	1,808,000	3,298,000	3,203	8.2
1984	2,714,000	6,012,000	4,564	12.7
1985	3,888,000	9,900,000	6,310	19.1
1986	5,298,000	15,198,000	8,592	27.6
1987	7,005,000	22,203,000	11,690	39.3
1988	8,991,000	31,194,000	14,934	54.3
1989	11,361,000	42,555,000	19,196	73.5

[a] International Manufacturers with U.S.-based sales offices are counted in U.S. totals, but not international.

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CENSUS OF TOP TEN PERSONAL COMPUTER VENDORS, BY DOLLAR VALUE OF INSTALLED BASE (as of 12/31/83)

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE IN DOLLARS BASIC	PURCHASE PRICE IN DOLLARS AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	CUMULATIVE NUMBER SHIPPED OUTSIDE U.S.	CUMULATIVE NUMBER SHIPPED	SHIPMENTS NEXT 12 MONTHS
Apple	Apple II, IIe	6802		7,330	2,500	05/77	985,000	335,000	1,320,000	405,000
	Apple III	6502		4,240	6,000	11/80	44,000	16,000	60,000	X
	Lisa	68000		10,000	7,500	--/83	15,500	4,500	20,000	X
	Lisa II	68000		3,495	4,500	--/84	0	0	0	125,000
	Macintosh	68000		2,495	2,495	--/84	0	0	0	425,000
	Apple IIc	65C02		1,295	1,295	--/84	0	0	0	NA
						TOTAL	1,044,500	355,500	1,400,000	
Commodore	64	6510		400	400	08/82	750,000	500,000	1,250,000	2,500,000
	Super Pet	6502B		1,995	1,995	07/81	45,000	54,000	100,000	30,000
	PET/CBM	6502		995	1,295	10/77	220,000	290,000	515,000	96,000
	VIC/20	6502A		150	150	06/81	1,090,000	900,000	2,000,000	500,000
	128	6510		795	795	10/83	10,000	10,000	20,000	250,000
	Executive 64	6510		1,000	1,000	02/83	10,000	10,000	20,000	300,000
						TOTAL	2,125,000	1,764,000	3,889,000	3,676,000
Digital Equipment Corp.	Mini MINC	LSI-11		9,900	11,000	10/79	5,850	820	6,670	NA
	325, 350	F11		4,495	4,495	--/82	9,950	2,300	12,250	10,000
	Rainbow 100	Z80, 8088		3,245	3,245	--/82	57,050	14,100	71,150	95,000
	VT100 (18X Kit)	Z80		5,000	5,000	01/82	4,500	500	5,000	NA
	Decmate II	6120		3,740	3,790	01/83	18,000	4,000	22,000	25,000
	Data System 150	LSI-11		10,900	15,000	03/79	1,200	900	2,100	X
						TOTAL	96,550	22,620	119,170	
Hewlett-Packard	9835	HP		9,000	13,200	12/78	3,620	4,580	8,200	NA
	9825	HP		5,900	10,900	01/76	13,015	22,285	35,300	2,000
	9845	HP		12,000	28,800	11/77	7,500	11,000	18,500	1,000
	9830	HP		4,900	16,500	11/72	5,000	5,000	10,000	X
	9816A/S	68000		3,650	5,000	11/82	6,400	9,600	16,000	14,000
	9826A/S	68000		9,000	11,803	06/81	4,400	6,600	11,000	2,500
	9836A/S	68000		12,000	14,500	01/81	6,460	8,190	14,650	7,000
	125	Z80		4,950	6,200	09/82	10,650	3,500	14,150	4,000
	83	HP		2,250	2,550	01/81	2,500	2,500	5,000	X
	85	HP		2,750	3,550	01/80	34,600	36,400	71,000	12,000
	86	HP		1,795	3,700	07/82	10,000	11,500	21,500	15,000
	87	HP		2,495	4,790	03/82	4,400	4,500	8,900	X
	120	Z80		2,775	2,775	12/82	4,550	4,000	8,550	5,000
	150	8086		3,995	3,995	10/83	5,000	5,000	10,000	100,000
	220	68000		3,000	5,000	04/83	1,500	1,000	2,500	10,000
	110	80C86		2,995	2,995	06/84	0	0	0	NA
						TOTAL	119,595	135,655	255,250	
IBM	5150 (PC)	8088		1,565	4,500	10/81	774,900	80,100	855,000	1,000,000
	Portable	8088		2,795	2,795	--/84	0	0	0	100,000
	PC 3270	8087, 68000		6,720	8,995	--/84	0	0	0	NA
	XT	8088		4,995	7,500	05/83	40,000	5,000	45,000	300,000
	XT370	8088, 68000		8,795	11,300	--/84	0	0	0	10,000
	PC Jr	8088		700	1,200	--/84	0	0	0	250,000
	5100	IBM		6,300	13,000	11/75	4,300	1,000	5,300	X
	5110	IBM		9,900	17,000	02/78	13,500	2,600	16,100	X
	5120	IBM		9,340	15,000	02/80	6,500	1,600	8,100	X
	Sys/23 Datamaster	8085		9,830	12,530	07/81	23,000	8,000	31,000	NA
	3741/3-4	IBM		4,000	4,000	NA	2,600	31,700	34,300	X
	9000 Series	68000		10,000	10,000	--/82	1,000	0	1,000	X
						TOTAL	865,800	130,000	995,800	
Kaypro Corp.	Kapro II, 10	Z80		1,795	1,795	03/82	100,000	20,000	120,000	NA
	Model 4 Plus 88	Z80		1,995	1,995	--/84	0	0	0	NA
						TOTAL	100,000	20,000	120,000	
Osborne Computer Co.	Osborne 1	Z80		1,495	1,795	07/81	120,000	46,000	166,000	X
	Executive	Z80		2,500	2,500	--/83	30,000	10,000	40,000	X
	PC	8086		3,000	3,000	--/84	0	0	0	NA
						TOTAL	150,000	56,000	206,000	
Sinclair (U.S. Only)	ZX/80,81,1000	Z80-A		100	150	01/82	1,100,000	-	1,100,000	300,000
	TS2068	Z80-A		179	179	08/83	50,000	=	50,000	50,000
						TOTAL	1,150,000	-	1,150,000	350,000
Tandy/Radio Shack	TRS-80/1	Z80		499	1,000	09/77	247,500	27,500	275,000	X
	TRS-80/II, IV	Z80		700	2,000	09/81	204,000	39,000	243,000	NA
	TRS-80/III	Z80		3,450	2,000	07/79	102,000	14,000	116,000	X
	TRS-80/16	68000		4,999	9,000	--/82	28,700	3,300	32,000	NA
	TRS-80 Color	6809		275	399	12/83	190,000	47,000	237,000	NA
	TRS 80-100	80C85		799	850	--/83	83,000	12,000	95,000	100,000
						TOTAL	855,200	142,800	998,000	
Texas Instruments	PRO	8088		1,600	3,900	08/83	35,000	0	35,000	NA
	742,770,771	NA		5,745	10,000	--/77	11,050	30,500	41,550	X
	99/4	TI9900		650	1,000	11/79	19,850	150	20,000	X
	99/4A	TI9900		150	150	07/81	1,250,150	29,850	1,280,000	X
						TOTAL	1,316,050	60,500	1,376,550	

The complete personal computer census will be available in the deluxe addition of EDP/IR's Review and Forecast special report. The report will be available this Fall for $995. Call 617-872-8200 and ask for Mary Trayte.

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REVIEW & FORECAST
Part II

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

DAVID MOSCHELLA, ED. Oct. 25, 1984 ● Vol.20,NO.11,12 P.J. MCGOVERN, PUBLISHER

IDC INTERNATIONAL DATA CORPORATION

IBM'S LARGE SYSTEM MARKET SHARE HOVERS AT 74%; OTHER MAINFRAMERS START TO SHARE HIGH-END GROWTH IN 1984

Ever since the introduction of IBM's 308X family, the giant from Armonk has been telling the world that demand for its large system products is at record levels. But that's only part of the story. The combination of strong shipments from IBM and relatively flat sales from its traditional competitors has pushed IBM's market share to levels not seen since the early 1970s.

After years of wide fluctuations, IBM's large system (308X-class) market share has been at least 74% in terms of dollar value over the 1982-84 period. Perhaps more tellingly, when one combines the share of IBM and the PCMs, the number gets up into the unprecedented 85% range. Whatever one chooses to make of this shift, it should be noted that the changes began in 1982, the first year after the government dropped its 13-year-old antitrust suit.

IBM's growing market dominance has coincided with its establishment of a clear technological edge. As Sperry, CDC, Honeywell, and Burroughs enjoy their first full year of 308X class system shipments, IBM is ready to move on to its next generation of processors. Similarly, as the PCM disk makers struggle, IBM is prepared to make the next turn of the crank on its 3380 technology. At the high end of the market, only the Japanese seem capable of keeping pace. Honeywell's decision to OEM 3380s from IBM is one of the more visible symbols of IBM's growing hardware leadership. Some key points about the mainframe market:

- Growth. IDC estimates that the value of worldwide shipments of large scale systems (IDC size classes six and seven) grew 18% in 1983 and that it will grow 11% in 1984. Over the next five years, IDC expects the value of worldwide large system shipments to grow at 8.8% per year. Most of the growth will continue to be in the IBM sector.

- Scientific processors. Over the last year or so there has been a marked increase in vendor emphasis on areas such as floating point performance, Fortran, array processors, and supercomputers.

- New products. In order to get new business, the Bunch companies are OEMing PCs and minicomputers often without insisting on compatibility with existing systems. NCR, Burroughs, and Honeywell are all selling Unix systems, and Sperry and CDC should follow soon.

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Mainframe market overview

The signs of transition are everywhere. Honeywell will get its large systems from NEC and its large disks from IBM. Sperry is hoping that Trilogy can keep itself together long enough to develop the chip technology for Sperry's next generation of mainframes. DEC has dropped its plans to build larger versions of its 10 and 20 series systems. NCR is taking a multiprocessor approach to building large systems. Of the original seven dwarves, only CDC and Burroughs continue to press on alone. CDC has, however, dumped its 3380 efforts and has spun out its supercomputer work to ETA systems, and Memorex's 3380 efforts have been a drain on Burroughs' otherwise solid recovery.

What it all adds up to is simple. As far as traditional mainframe architectures go, the race for improved price/performance is quickly coming down to IBM vs. Japan (Fujitsu, Hitachi, and NEC). By the middle of next year, this will be clear when these vendors start shipping 25-MIP machines.

The problems of the Bunch and the PCM disk makers are more or less the same. As product development costs soar, it has become difficult to remain profitable because of relatively low shipment volumes. Not only have Fujitsu and Hitachi emerged as IBM's principle CPU competitors, they are rapidly becoming the major forces in the IBM-compatible storage market as well.

But this is not to say that IBM will no longer have competition from U.S. firms in the large system market. New high-end technologies are starting to emerge that may eventually put pressure on IBM's price/performance levels, but not for at least a few years. Among some of the key areas:

- Multiprocessing systems. Both multiprocessing and multi-microprocessor systems will be a much larger part of the high end of the market than they are today. Today, only Tandem is really using multiprocessors to build 308X class systems, and nearly all other multi-microprocessor systems being built or talked about today are geared at supermini, not mainframe performance. Synapse is an exception, but it has been unable to meet its production schedules.

  A lot of work in multiprocessing algorithms still needs to be done, and such systems probably won't compete head on with mainframes for some time. Elxsi has made some waves with its multiprocessor approach with each of its boxes capable of about four MIPS.

- Data base machines. Teradata seems to be about the only company of interest. Initial reports from some of its Beta sites have indicated that its multi-microprocessor relational data base system can perform as claimed, and the company is getting the funding it needs. Since one of the primary roles of the mainframe of the future will be as a data base server, this is an area of potentially significant development since multi-microprocessor systems are well suited to data base search and retrieval operations.

- Vector processors. Interest in vector processing systems has reached unprecedented levels. In addition to Cray, CDC, and the Japanese, new start-ups, such as Convex Computers, and many universities are focusing on number-crunching capabilities, an area that IBM is attempting to greatly improve.

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IBM/PCM SHARE OF U.S. UNIT SHIPMENTS, LARGE-SCALE COMPUTERS, (1965-84)
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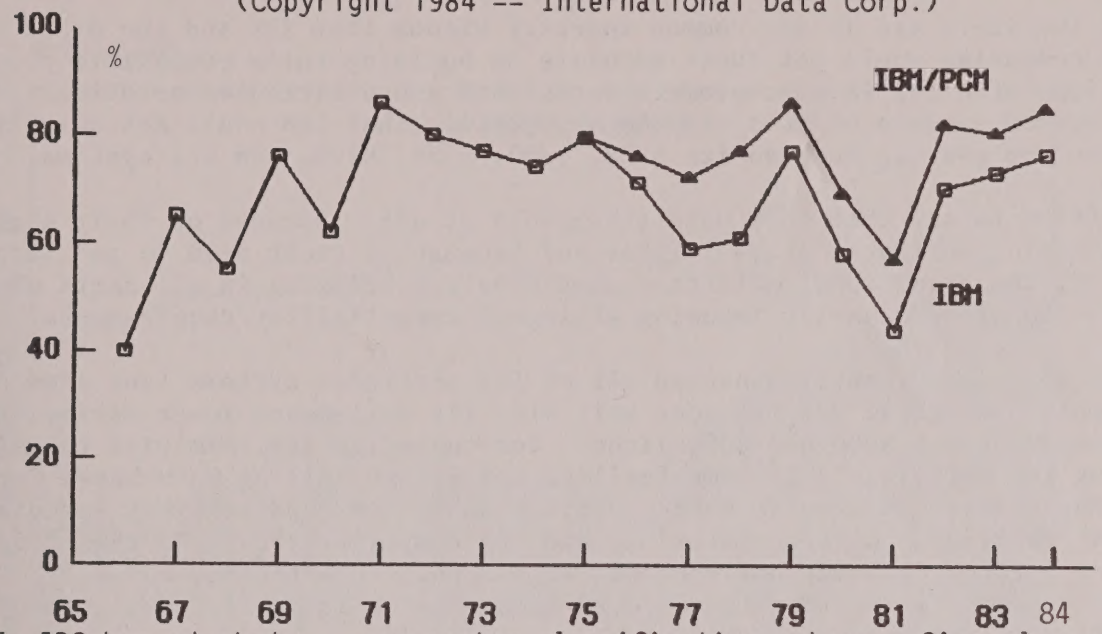

NOTE: IDC has adopted a new system classification scheme. Size classes six and seven (308X-class systems) of the old General Purpose computer category have been renamed "Large-scale Systems" which will henceforth be analyzed and forecasted separately (see page 5). As to the chart above, IBM's share is even higher when expressed in terms of dollar value since its systems generally carry more peripherals than some of its competitors.

Unix gains large system momentum

If there is a common thread among the new high-end technologies discussed above, it is a widespread support of the Unix operating system. Unix (with all its versions and enhancements) is clearly the operating system of choice for the great majority of the market's start-ups, both in the commercial and scientific realms. Within the mainframe world, Amdahl and CDC have shown the most interest. Burroughs says it has no plans to offer Unix on its mainframe systems. Honeywell and Sperry are sitting on the fence.

The commercial support of Unix among start-ups has been well documented elsewhere. What hasn't gotten much play has been the shift toward Unix in the supercomputer area. Existing suppliers such as Cray, CDC, and Denelcor are all intending to support Unix, as is start-up Convex. In Japan, NEC will use Unix on its supercomputers, while Fujitsu and Hitachi, at this time, seem committed to the IBM-compatible path. None of these vendors really expects its Unix software to be portable, but they hope to improve their application development productivity.

Since software costs are now the dominant expense in many supercomputer environments, Unix's programming facilities and large base of college-trained programmers are proving attractive. And because no one wants to rewrite existing applications to take advantage of vector processing possibilities, there is an emerging industry-wide compiler war. Fujitsu and NAS claim they can recompile most IBM Fortran programs to run on their vector processing boxes. Convex Computers (Richardson, Texas) claims the same for DEC VMS Fortran programs. All three vendors promise dramatic performance increases.

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Mainframe vendor round-up

About two years ago it was common industry wisdom that IBM and the other mainframe companies would put their emphasis on building fully compatible product families, offering large customers integrated and distributed solutions. The most common example of this was the expectation that IBM would act quickly to resolve the overlap between its S/38, 4300, S/36, 8100, and S/1 systems.

Suffice to say that this hasn't happened at all. Because of their desire to maintain profitable product lines and because of their need to get into new markets, the traditional mainframe companies are bringing in all sorts of new boxes without necessarily imposing stringent compatibility requirements.

IBM has significantly enhanced all of its mid-range systems (and even added a multi-user PC); NCR has done well with its Unix-based Tower series and has beefed up its 9000 and 8000 lines. Burroughs remains committed to maintaining two different mainframe families and is now selling Unix-based Convergent Megaframes. Sperry is making deals with Encore (and possibly Sequoia) and is reselling Apollo workstations and IBM compatible PCs. Honeywell is hawking Stratus systems, has come out with a Unix workstation, and will probably announce an IBM compatible PC soon. Below is a brief run down of the significant 1984 mainframer activity.

• IBM. It's now the fourth quarter and IBM's mainframe sales have yet to slow down. Despite being the last year of full 308X activity, shipments are still strong, with IBM claiming an 18% increase in "shipments of 308X engines." But because of several price cuts, revenue growth has slowed some. A new dyadic 4381 was just announced. The new machine will overlap with the 3083 to some extent, but should appeal to those who would rather not install a 308X.

As for the high end, despite rumors about the "Y series" or eight processor 308X systems, IDC still expects that IBM will announce Sierra around the spring of 1985, but because IBM is feeling little competitive pressure at the high end, this decision could be delayed for financial reasons. Since 3084s continue to sell well, there seems to be plenty of demand at the top of the line.

On the scientific front, IBM continues to express interest in vector processing systems. It has made no secret of the fact that within its Kingston labs it has a system based around multiple 4300s and multiple array processors from Floating Point Systems which is said to be able to turn out Cray-like performance even without special software.

• Amdahl. Amdahl says it expects to ship 20% more 58XX systems in 1984 than in 1983, but with price cuts and upgrades this doesn't seem to be translating into a significant revenue increase. Demand for 3380-type disks has been strong but supply from Fujitsu has been lacking. Recently, the two companies agreed to formally cooperate on their R&D after years of squabbling.

Seeking to diversify its product lines, Amdahl has entered the supercomputer market with machines made by Fujitsu. Sales estimates for the next 12 months range from 6-12 systems, but it is notable that for a product whose existence has been widely known for a long time, not one firm order has been placed yet. However, this is a new and complex product with a long sell cycle, and many customers may well be waiting to see what sort of vector processing facility Sierra may have before committing to an unproven $10 million machine.

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DOLLAR VALUE OF WORLDWIDE GENERAL-PURPOSE SHIPMENTS, BY SIZE CLASS
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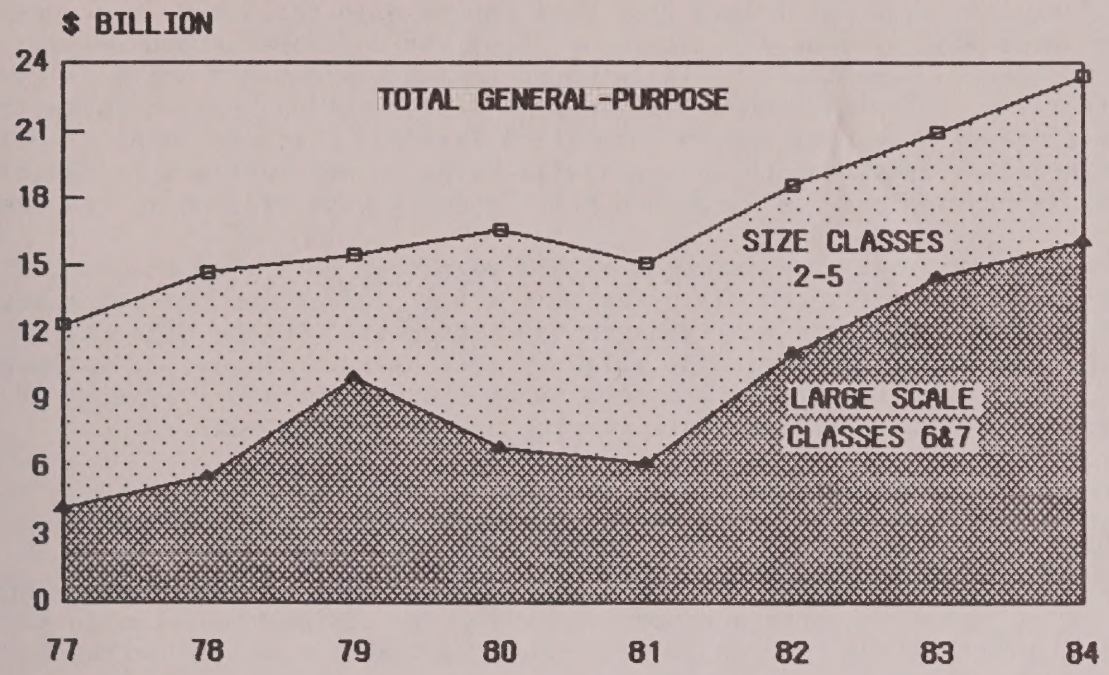
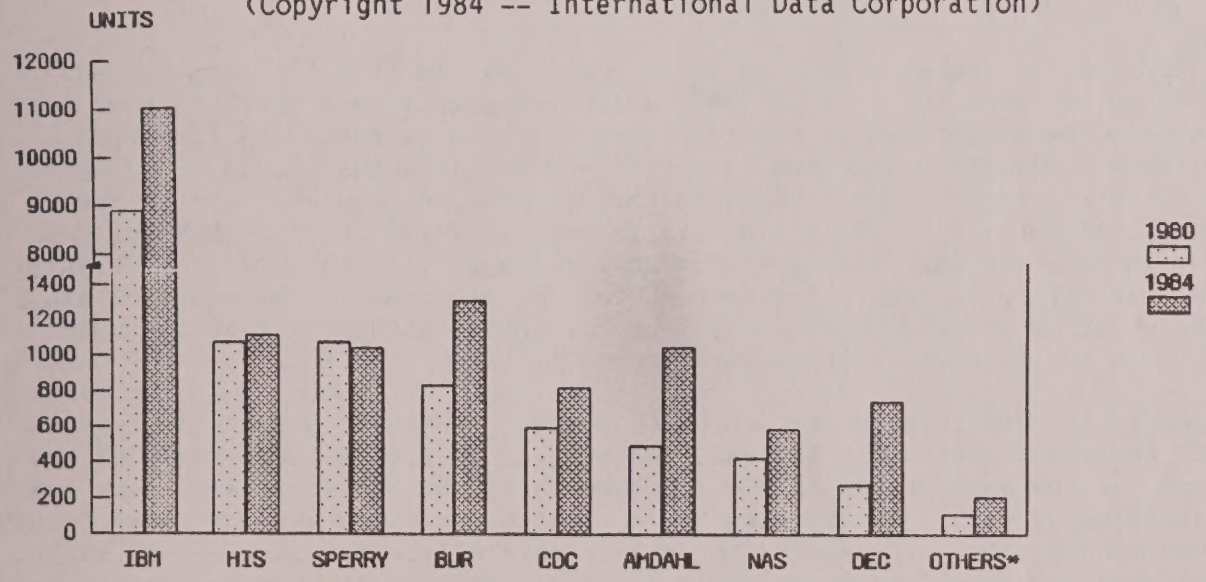


WORLDWIDE INSTALLED BASE OF LARGE-SCALE SYSTEMS, 1980 vs. 1984
(Copyright 1984 -- International Data Corporation)



The top chart shows that the high end of the mainframe market has become increasingly dominant over the last few years. Sales of 4300 systems have been relatively flat for IBM since the boom years of 1980-81. BUNCH sales in this part of the market were, however, quite good in 1983.

The bottom chart shows that Honeywell and Sperry have had trouble expanding their large system installed bases over the last four years. But because the classification line between large and medium systems can never be exact, IDC classification decisions can also affect the market shares shown.

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• Burroughs. Sales of the company's 7900 systems have been very strong in 1984, and the company will ship well over 100 systems this year. In addition, sales of its A-series mainframes have been "above expectations." Burroughs has just made what it considers its most important software announcement in the last decade. Essentially, its Interpro software greatly simplifies system software tasks, offering menu-driven network configuration, screen formatting, data dictionary, and other ease-of-operation features. It also announced a low-end A-Series system which it hopes will bring in new business in addition to being an upgrade for its large and still growing base of 1000 series users.

Burroughs says that 1984 has been a good year from both a revenue and customer base point of view. It notes that a full 50% of its B25 shipments and 30% of B1000 shipments have gone to new customers. On the high end, Burroughs sees mainframe demand up slightly over historical levels, estimating that the power requirements of the top 25% of its customers are growing at about 50% a year while the rest are growing at 15%-30% per year.

Burroughs has also stepped up its interest in third party suppliers. In addition to the deal with Convergent, it is working with National Semiconductor to build a distributed, fiber optic LAN-based system, built around National's 32-bit microprocessor. This system is more than a year away, however. In an effort to perhaps someday increase its minimal position in the technical computing area, Burroughs has acquired Graphtek, a CAD software supplier whose software runs on IBM hardware. Before Burroughs could even hope to be a force in this market it would have to significantly improve its floating point performance. Even internally, most of the company's design work is done on non-Burroughs systems.

• CDC. After years of playing third fiddle within CDC, the computer systems group has been the star of 1984, while peripherals and services have both suffered. The heightened interest in number-crunching computers for areas such as CAD, simulation, seismic analysis and the like has played directly into CDC's strength. This along with the improved economy and revitalized product line has led to solid growth. To keep it going, CDC has been very active in CAD, signing joint development agreements with Northrop and Chrysler. It is also trying to earn a presence on the factory floor. Shipments of its Cyberplus array processor haven't yet begun. CDC's abandonment of its 3380 compatible business comes as no surprise.

• Honeywell. After some six months of delays, Honeywell began shipping its DPS/88 systems in July of this year, and expects to get at least forty of the systems out the door by year's end. Shipments of the older DPS 8 systems are also holding up well. The company has not yet begun to market the large S-1000 systems made by NEC. It expects to deliver some of the NEC machines in 1985, but expects volume shipments to begin early in 1986. A key hurdle will be to get Honeywell's GCOS 8 to run on the NEC system. A spokesman said this work is ahead of schedule. Honeywell has recently agreed to OEM 3380 disks from IBM to be used on its DPS 88 family; this seems to imply that NEC's peripherals may be left out of the S-1000 deal.

• NAS. National Advanced Systems says that unit shipments of its 8000 and 9000 series of mainframes (equal to the IBM 3083 and 3081 systems respectively) are up a solid 35% this year with much of the growth focussed on the high end. Sales of its 3380 type disk should reach 3,000 by the end of the year, putting the company close to STC for distant second in this marketplace. The

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VALUE OF WORLDWIDE SHIPMENTS OF LARGE-SCALE COMPUTERS
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	1984*		1983		1982		1981		1980	
	$M	%	$M	%	$M	%	$M	%	$M	%
IBM	11,945	74.3	10,736	74.0	8,187	73.5	2,796	45.4	3,579	52.1
Amdahl	753	4.7	685	4.7	344	3.1	281	4.6	381	5.6
NAS	415	2.6	335	2.3	225	2.0	122	2.0	123	1.8
PCM Periph.	600	3.7	640	4.4	840	7.6	700	11.4	450	6.5
IBM Base	13,713	85.3	12,396	85.5	9,596	86.2	3,899	63.3	4,533	66.0
Burroughs	576	3.6	533	3.7	177	1.6	531	8.6	537	7.8
CDC	514	3.2	468	3.2	394	3.5	370	6.0	201	2.9
Cray	164	1.0	125	0.8	122	1.1	91	1.5	38	0.6
DEC	115	0.7	174	1.2	276	2.5	65	1.1	64	0.9
Denelcor	9	0.1	2	0.0	6	0.1	0	0.0	0	0.0
Honeywell	554	3.5	495	3.4	206	1.8	458	7.4	916	13.3
NCR	25	0.1	0	0.0	24	0.2	0	0.0	0	0.0
Sperry	400	2.5	314	2.2	335	3.0	742	12.0	583	8.5
Non-IBM Base	2,357	14.7	2,111	14.5	1,540	13.8	2,257	36.7	2,339	34.0
TOTAL	16,070	100.0	14,507	100.0	11,136	100.0	6,156	100.0	6,872	100.0

NOTE: *Preliminary 1984 estimate.

VALUE OF WORLDWIDE GENERAL-PURPOSE COMPUTER SHIPMENTS
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	1983			1982			1981	
	$M	% Total	% Δ	$M	% Total	% Δ	$M	% Total
IBM	13,982	66.9	5.4	13,265	71.2	34.8	9,740	65.1
Amdahl	685	3.3	99.1	344	1.8	13.9	302	2.0
NAS	360	1.7	33.8	269	1.4	40.8	191	1.3
Magnuson	9	*	-18.2	11	0.1	-72.5	40	0.3
IPL	17	0.1	13.3	15	0.1	-28.6	21	0.1
Cambex	2	*	0.0	2	*	0	2	*
PCM Peripherals	1,050	5.0	-15.0	1,235	6.6	21.7	1,015	6.7
Subtotal PCMs	2,123	10.2	13.2	1,876	10.0	19.4	1,571	10.4
Total IBM Base	16,105	77.0	6.4	15,141	81.2	33.9	11,311	74.8
Honeywell	886	4.2	36.3	650	3.5	-19.1	803	5.3
Sperry	1,297	6.2	29.1	1,005	5.4	-11.5	1,135	7.5
Burroughs	1,269	6.1	74.1	729	3.9	-14.2	850	5.6
NCR	340	1.6	42.3	239	1.3	0.4	238	1.6
CDC	626	3.0	48.7	421	2.3	4.2	404	2.7
DEC	229	1.1	-21.3	291	1.6	68.2	173	1.2
Cray	156	0.8	7.9	145	0.8	40.8	103	0.7
Denelcor	2	*	-75.0	8	*	–	–	–
Total Non-IBM	4,805	23.0	37.8	3,488	18.8	-8.4	3,806	25.2
Grand Total	20,910	100.0	12.2	18,629	100.0	23.2	15,117	100.0

Notes: *Less than 0.05%. These two charts show IDC's new (top) and old (bottom) ways of viewing the mainframe market. The top chart shows only the activity of size class six and seven systems of the old general-purpose computer category shown in its entirety below.

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company wouldn't comment on how well its vector processing attachment was being received, but the product was only announced a few months ago. 256K memory chips are now being used in NAS 6600 and 8000 families.

• Sperry. The company wants help at the high end, and it has not given up on Trilogy. In fact, it has invested another $2 million as the two companies try to jointly develop gate array technology for Sperry's next generation of large systems. Meanwhile, sales of the long delayed 1100/90 series have begun. The company expects to sell between 50 and 75 systems in 1984; sales of the older 1100/80s are now mostly limited to multi-processor add-ons to existing /80 installations. The company notes its European business has picked up, especially in banking and in universities. Overall customer demand for processing power is growing at 20-25% per year, the company says.

Sperry has undergone some significant reorganization in 1984. It has formed a separate microproduct division which is responsible for its PC, communications, terminals and Sperrylink systems. It has also redefined the line between its computer and defense businesses. From now on, specialized computers sold to Sperry's defense customers will be included in the Defense division not the Computer Systems group. This bookkeeping change will reduce Sperry's computer systems revenue by about $500 million in 1984.

Sperry has also been busy making deals with other vendors. For its fiscal 1985 (April 1984 to March 1985) it expects to sell some $150 million of its Sperry PC (made by Mitsubishi) and $40 million of its transportable PC (made by Corona). In addition, the company has invested $3.5 million in Encore (working on a multi-microprocessor system, scheduled for shipment in mid-1985), and has held talks with Sequoia (a fault-tolerant multi-microprocessor system).

• DEC. In an effort to reassure its base of System 10 and 20 users, DEC has in the last few months re-established its Large Computer Group. The new group will not only sell 10s and 20s, it will also be responsible for selling Vax's into 10 and 20 accounts. The idea is to have one group responsible for assuring a smooth migration/conversion process.

Meanwhile, DEC has announced the 2065 and 1095 which improve price performance by about 20% over their predecessors. (The 10 and 20 systems use the same CPU with different operating systems; the 10 is geared to sophisticated users in R&D type work; the 20 is a more user-friendly system with more software overhead.) DEC says that total sales into this customer base have risen over 1983, but that Vax's are taking a larger percentage. Sales of 10s and 20s are down some over 1983, but 1983 was a very good year for those systems.

DEC's new high-end Vax system (Venus) will be announced October 31. This will be the first member of the Vax line that is clearly more powerful than the members of the 10 and 20 families. A big question for DEC is how soon it will be able to ship Venus in the quantities the market will demand.

• NCR. NCR has had a good 100th anniversary year, thanks to a revitalized product line. Much of its success has been at the low end. It has sold a couple of thousand of its Unix-based Tower systems, and a new version of that system based around multiple 68010s has just been announced. Sales of the NCR-32 9000 series have also been strong. NCR doesn't really compete at the high end of the market although multi-processor versions of its 8600 systems can and will be used to produce 308X-class performance.

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LARGE-SCALE COMPUTER MARKET -- U.S.-BASED MANUFACTURERS
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	1,840	9,900	5,580	43.8
1979	2,860	11,800	10,020	55.2
1980	2,300	13,700	6,870	57.5
1981	1,580	14,100	6,160	59.5
1982	2,600	15,200	11,140	68.3
1983	3,360	16,600	14,510	75.9
1984	3,700	17,900	16,070	81.7
1985	3,940	19,300	16,580	90.1
1986	4,390	20,800	18,500	97.4
1987	4,840	22,500	20,390	106.1
1988	5,260	24,300	22,140	114.6
		UNITED STATES		
1978	1,200	5,900	3,720	26.5
1979	1,460	6,700	5,270	32.1
1980	1,200	7,800	3,790	33.1
1981	960	8,300	3,890	35.6
1982	1,440	8,800	6,800	41.2
1983	1,830	9,500	8,170	44.8
1984	2,040	10,200	8,750	48.0
1985	2,140	11,000	9,180	52.9
1986	2,430	11,900	10,470	57.2
1987	2,700	12,900	11,610	61.8
1988	2,950	13,900	12,690	66.7
		INTERNATIONAL		
1978	640	4,000	1,860	17.3
1979	1,400	5,100	4,750	23.1
1980	1,100	5,900	3,080	24.4
1981	620	5,800	2,260	23.9
1982	1,160	6,400	4,340	27.1
1983	1,530	7,100	6,340	31.1
1984	1,660	7,700	7,320	33.7
1985	1,800	8,300	7,400	37.2
1986	1,960	8,900	8,030	40.2
1987	2,140	9,600	8,780	44.3
1988	2,310	10,400	9,450	47.9

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GENERAL-PURPOSE COMPUTER MARKET -- U.S.-BASED MANUFACTURERS
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	10,800	113,000	14,740	88.6
1979	10,200	105,500	15,710	98.2
1980	19,900	110,300	16,610	108.1
1981	20,900	109,400	15,120	110.3
1982	18,300	115,700	18,630	120.5
1983	16,890	121,400	20,910	129.0
1984	17,900	122,500	23,430	137.3
1985	19,640	127,700	24,490	147.0
1986	21,290	129,000	26,830	155.9
1987	20,640	131,600	28,800	165.8
1988	21,660	135,400	30,960	176.5
		UNITED STATES		
1978	4,300	58,000	7,590	48.4
1979	4,700	53,200	8,020	53.0
1980	9,800	54,700	8,800	58.2
1981	10,400	55,100	8,540	61.6
1982	9,300	57,200	11,780	68.3
1983	8,300	60,000	11,610	71.7
1984	7,940	60,400	12,230	76.5
1985	9,240	62,400	13,040	82.2
1986	10,330	64,400	14,590	87.4
1987	10,000	65,700	15,750	92.6
1988	10,350	68,100	16,990	99.1
		INTERNATIONAL		
1978	6,500	55,000	7,150	40.2
1979	5,500	52,300	7,690	45.2
1980	10,100	55,600	7,730	49.9
1981	10,500	54,300	6,580	48.7
1982	9,600	58,500	6,850	52.2
1983	8,590	61,400	9,300	57.3
1984	9,960	62,100	11,200	60.8
1985	10,400	63,300	11,450	64.8
1986	10,960	64,600	12,240	68.5
1987	10,640	65,900	13,050	73.2
1988	11,310	67,300	13,970	77.4

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LARGE-SCALE COMPUTER CENSUS, AS OF JAN. 1, 1984

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Large-Scale Computer Systems. A large-scale system is either a general-purpose computer or a high-speed scientific computer with an approximate system price greater than $1 million. These machines are usually located in a centralized computer room. Representative examples include IBM 303X, 308X, Cray Computer products, and their competitors. Systems in this census were formerly included in size classes six and seven of the old General Purpose category. Average purchase prices are based on system price including peripherals, except in the cases of plug-compatible vendors Amdahl, IPL, and National Advanced Systems, where only CPU value is counted.

NAME OF MANUFACTURER	COMPUTER MODEL	OLD SIZE CLASS	NEW SIZE CLASS	PURCHASE PRICE IN DOLLARS BASIC AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED
Amdahl	470V/5 II	6	L	2,304	09/77	31	28	59
	470V/6 II	7	VL	3,407	06/75	113	45	158
	470V/7,A,B	7	VL	2,492	09/78	130	100	230
	470V/7C	6	L	1,150	02/81	40	22	62
	470V/8	7	VL	2,541	09/79	151	94	245
	580/5850,60,70,80	7	VL	3,292	08/82	115	70	185
	TOTAL					580	359	939
Burroughs	B-7900 FHK	7	VL	6,600	08/83	28	7	35
	65/6700	6	L	3,311	11/69	120	95	215
	6800	6	L	1,778	06/77	270	105	375
	7700	6	L	6,730	08/73	37	24	61
	7800	7	VL	5,290	11/78	150	40	190
	6900	6	L	2,326	11/80	115	60	175
	6925	6	L	990	--/82	100	85	185
	TOTAL					820	416	1,236
Control Data Corporation	CYBER 172	6	L	2,096	07/75	14	38	52
	CYBER 173	6	L	3,483	09/75	7	18	25
	CYBER 174	6	L	4,366	09/75	12	12	24
	CYBER 175	7	VL	6,442	08/75	30	22	52
	CYBER 176	7	VL	7,890	01/78	17	3	20
	CYBER 203	7	VL	9,961	11/80	14	5	19
	CYBER 205	7	VL	11,505	01/81	14	5	19
	CYBER 73	6	L	2,748	03/72	21	28	49
	CYBER 74	7	VL	5,225	03/72	22	12	34
	CYBER 76	7	VL	8,261	03/72	8	9	17
	CYBER 170-730	6	L	2,349	06/79	80	52	132
	CYBER 170-740	6	L	3,178	04/80	10	5	15
	CYBER 170-750	6	L	4,717	08/79	30	15	45
	CYBER 170-760	7	VL	6,027	04/79	42	8	50
	CYBER 170-855	6	L	3,961	11/82	16	13	29
	180-865	7	VL	4,859	--/83	4	1	5
	180-875	7	VL	6,369	--/82	4	1	5
	180-875 DUAL	7	VL	9,029	--/83	1	0	1
	1604	6	L	1,829	01/60	1	0	1
	3600	6	L	2,202	06/63	4	2	6
	3800	6	L	2,684	12/65	10	0	10
	6200	6	L	1,907	11/70	0	0	0
	6400	6	L	2,846	05/66	30	9	39
	6500	6	L	3,864	12/67	12	10	22
	6600	7	VL	5,215	08/64	37	13	50
	6700	7	VL	6,275	07/70	2	0	2
	7600	7	VL	8,569	01/69	24	3	27
	STAR 100	7	VL	12,000	12/74	0	0	0
	TOTAL					466	284	750
Cray	1A, 1B	7	VL	8,663	04/76	10	7	17
	1S	7	VL	8,569	11/80	27	11	38
	XMP22, 24	7	VL	10,450	--/83	4	2	6
	M	7	VL	5,225	--/83	1	2	3
	TOTAL					42	22	64
Denelcor	HEP	6	L	1,300	02/82	6	2	8
Digital Equipment Corp.	1080/90	6	L	1,419	06/75	420	245	665
HIS	DPS 8/70	6	L	3,741	05/80	145	123	268
	DPS 88/81	7	VL	5,940	--/83	6	2	8
	DPS 88/82	7	VL	8,440	--/83	2	0	2
	G-600	6	L	3,553	04/65	6	5	11
	G-6050/60	6	L	3,396	07/71	30	38	68
	G-6070/80	6	L	5,110	07/71	10	15	25
	G-6180	7	VL	5,043	02/74	2	0	2
	H-8200	6	L	3,083	02/69	4	3	7
	H-66/40/60	6	L	3,844	10/74	80	146	226
	H-66 DPS, BC	6	L	3,686	07/78	130	204	334
	H-66/80	7	VL	6,005	10/74	15	42	57
	H-68/80	7	VL	5,139	10/74	15	1	16
	H-68/DPS	7	VL	6,106	09/78	23	10	33
	TOTAL					468	589	1,057

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DOLLAR VALUE OF U.S. COMPUTER SYSTEM SHIPMENTS, 1978-1987
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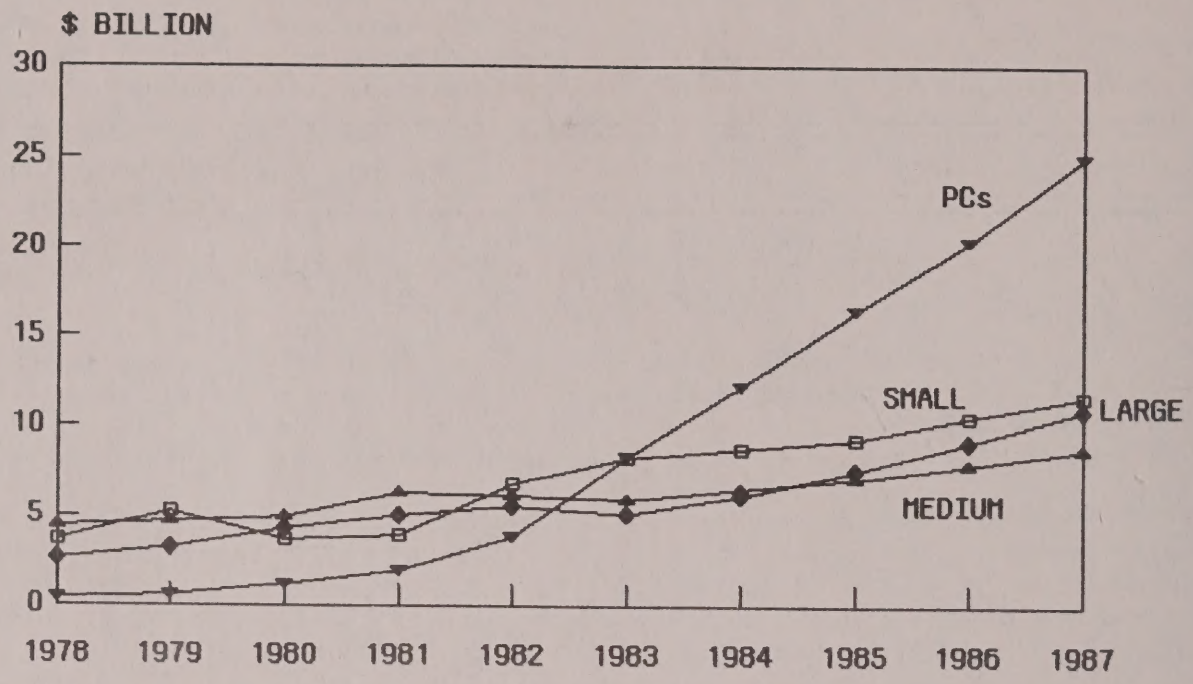

VALUE OF 1983 WORLDWIDE COMPUTER SYSTEM SHIPMENTS
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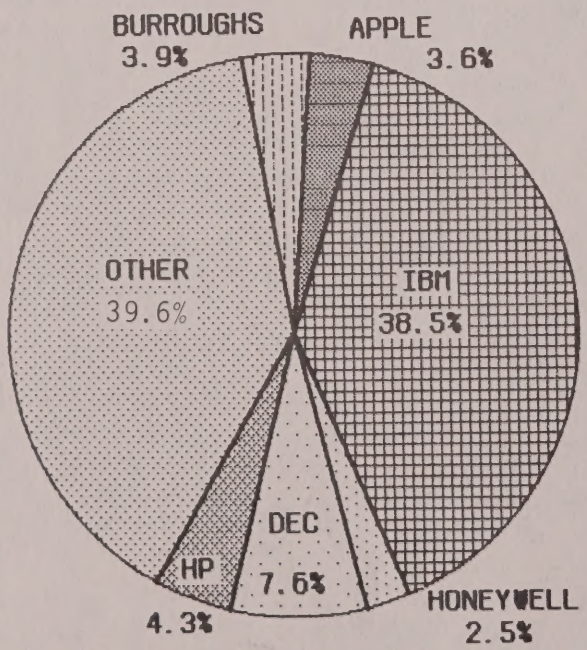
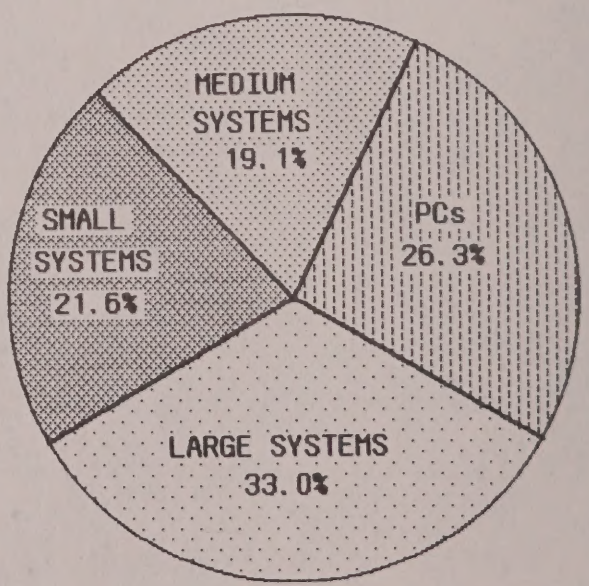


$44 BILLION



$44 BILLION

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ABOUT THE NEW DEFINITIONS

Long time readers of the Gray Sheet will notice significant changes in the way IDC is presenting its data this year. Over the last few years, the mainstay IDC classifications -- General Purpose Computers, Minicomputers, and Small Business Computers -- have become increasingly obsolete. Much as IBM has had to overhaul its operating systems every ten years or so, IDC had to change its market analysis architecture to keep pace with the industry's changing technology and distribution channels.

The old classification scheme presented many problems. For instance, the IBM 4300s and Vax 780 were in different categories even though these systems often compete head on. Similarly, as the traditional minicomputer vendors increased their emphasis on packaged systems sold direct to end users, the line between small business computers and minis had become altogether too fuzzy.

The new classifications -- small, medium, and large scale systems -- are based on IDC's perception of competitive positioning. Obviously, in a market as diverse as today's computer industry, no one criteria will comfortably place the more than 1,000 systems represented in IDC's census tables. But in understanding IDC's classifactions, it is best to keep in mind the following simple guidelines:

- Small-Scale Systems. These systems generally range from 2-16 users in typical commercial applications. Representative systems include the IBM S/36, DEC PDP-11 and Vax 730, and systems such as those from Altos. Average systems prices are normally in the $10,000 to $100,000 range. An attempt has been made to weed out those board-level products that were included in the old minicomputer category.

- Medium-Scale systems. These systems generally support from 17 to 128 users in a normal commercial environment. Included are the IBM 4300 line, the mid-range systems from the Bunch companies, and the high end of the lines from companies such as DEC, DG, and Prime. System prices tend to fall in the $100,000 to $1 Million range.

- Large-Scale systems. These are the very largest computers available from the traditional mainframe vendors. Large systems are expected to support more than 128 users in many commercial environments and have average prices of more than $1 Million. Representative systems include the IBM 308X, Sperry 1100/90, and Burroughs 7900, as well as supercomputers from Cray and CDC.

Since there are no hard rules to follow, border disputes -- i.e., the line between small and medium, and between medium and large -- are inevitable. But overall, the new definitions provide a much more appropriate framework to view the middle of today's market, especially the battle between IBM and DEC. Much as new software is often followed by improved releases, IDC recognizes that these definitions will go through a process of evolution and refinement.

As old issues are resolved, new ones continue to emerge. Methods are needed to compare networked PCs to mult-iuser systems. Additionally, multiprocessor systems, such as those from Tandem, are often bid directly against large scale systems. These difficulties will eventually be addressed, but for the time being, the reader should just keep them in mind while using IDC's data.

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Medium-scale systems

IDC's new medium-scale system category consists primarily of most of the old supermini class as well as size classes four and five (i.e., IBM 4361,81) of the general purpose category. Current systems are usually in the one to five MIPS range, but are offered at a wide array of prices.

The new category is thus a merger of some fast growth products (from the mini vendors) with some slow-to-no growth products (from IBM and the Bunch). Thus the overall 10% medium-scale growth rate expected in 1984 actually masks some very strong performances by DEC, DG, Prime and others, as well as some fairly poor performances by most of the Bunch companies in this area. These offsetting effects will be a significant factor in this market over the entire five-year forecast period.

This clash is symbolized by the battle between IBM and DEC. As the IDC data shows (opposite), in 1983 DEC actually outsold IBM in this market. This, however, is due to the fact that, caught between product cycles, IBM had a very poor year for 4300 sales in 1983. The availability of the 4361 and 4381 should improve the situation in 1984, but given DEC's strong VAX shipments this year, the mini king is still likely to come out on top.

From a performance point of view it is interesting to examine the relationship between medium and large scale systems. Back in 1978, two very significant products were introduced -- the IBM 3033U, and the VAX 11/780. The former had approximately five times the power of the latter. When IBM introduced its 308X series it became capable of offering (through the 3084) 30 times the power of a /780. DEC's new 8600 cuts the IBM lead to about 7-fold, but the new Sierra series should bring it back up into the 14-fold range.

The point of all this is that IBM's mainframe raw performance continues to easily outdistance what the supermini vendors can offer. It's only in pricing where the traditional supermini vendors can claim significant advantages.

Exactly the opposite is the case on the frontier between small and medium scale systems. In terms of absolute performance levels, medium scale systems should be able to easily retain a ten-fold edge over small-scale systems, but on a cost per MIPS basis they will continue to lag behind.

Market shares

Once one gets beyond DEC and IBM, the medium-scale systems market becomes a real dogfight, with no less than thirteen vendors having between one and seven percent of the market. Although Burroughs, Sperry and Honeywell show up in 1983's top six, at current growth rates this will change quickly with Tandem, Data General and Prime all ready to step on by. The Bunch vendors are, however, trying to protect their turf by OEMing more competitive systems that are often Unix based. Whether the Bunch can market these products in significant quan- tities remains to be seen.

Unix is also important to the old supermini crowd, but in a different way. As a rule, the larger vendors are still looking at Unix as a necessary evil. It's the smaller vendors -- Harris, Gould, PE and others -- which often lack applications software and some commercial operating system features -- that are showing the most enthusiasm for Unix.

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1983 WORLDWIDE SHIPMENTS OF MEDIUM-SCALE SYSTEMS
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Vendor	Total Sales $ Million Shipments	Total Sales Unit Shipments	Direct Sales $ Million Shipments	Direct Sales % of Total	Direct Sales Unit Shipments	Direct Sales % of Total
DEC	1,631	8,939	1,272	78	6,257	70
IBM	1,104	3,965	1,060	96	3,648	92
Hewlett-Packard	647	8,471	518	80	5,760	68
Burroughs	623	796	623	100	796	100
Honeywell	568	2,579	500	88	1,934	75
Sperry	534	592	523	98	562	95
Tandem	383	1,954	268	70	1,231	63
Data General	358	1,490	233	65	820	55
Prime	343	1,000	268	78	700	70
Four-Phase	211	1,627	190	90	1,383	85
Harris	190	910	160	84	746	82
Wang	173	696	171	99	682	98
Basic Four	123	820	111	90	705	86
NCR	119	766	119	100	766	100
Subtotal	7,007	34,605	6,015	86	25,991	75
Others	2,549*	1,637	1,964	77	1120	68
TOTAL	9,556	36,242	7,979	83	27,111	75

*Includes third party peripherals.

WORLDWIDE 1983 MARKET SHARES FOR MEDIUM SCALE SYSTEMS
DOLLARS (Left); UNITS (Right)
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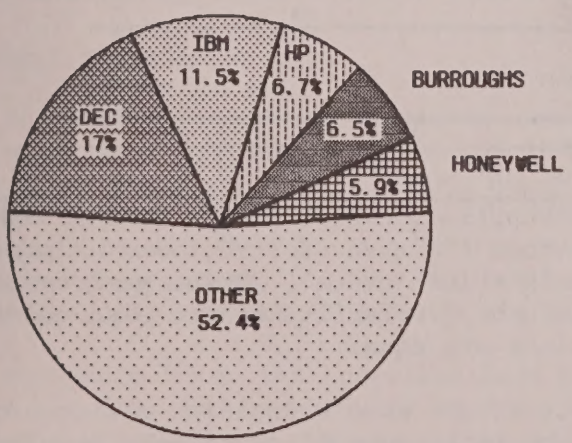
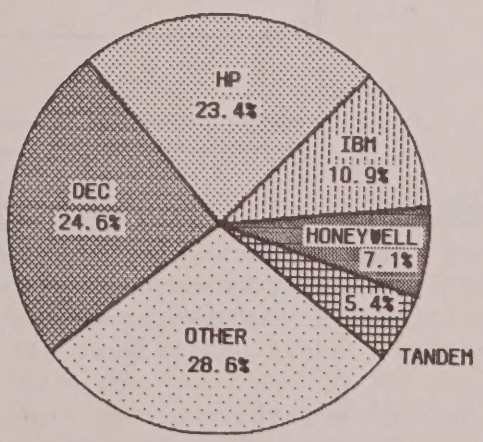


$9,556 MILLION



36,242 UNITS

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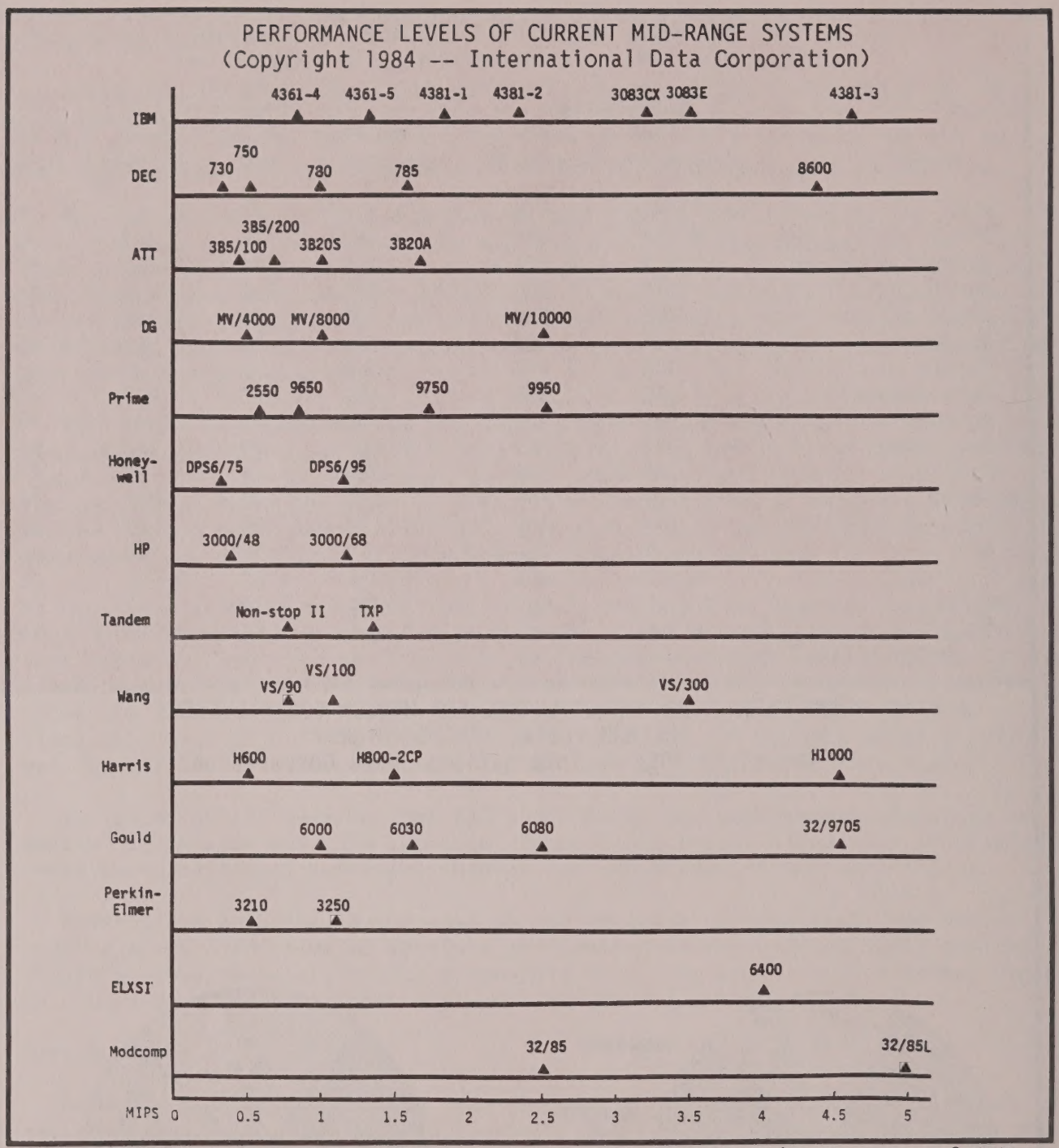

The MIPS figures used have been vendor supplied, except in the case of IBM. They refer primarily to millions of Whetstone (Fortran) instructions. Internal instruction rates do not always translate into overall system performance. The efficiency of the operating system and the I/O facilities are also major factors. Additionally, not all instructions are equal.

Raw price/performance is only one aspect of the user's decision-making process. Peripheral support and capacity, the total cost of ownership, development tools, third-party products, software pricing, languages supported, expandability, communications, service, support, and training are all important ingredients. As is the case in the mainframe world, conversion from one vendor to another is often a difficult process.

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Small-Scale Systems

The small-scale systems market also includes both fast and slow growth sectors. (In this case, the former minicomputer and small business computer markets, respectively.) But here the net result is an overall expansion of 20% per year over the 1983-1989 in terms of the value of worldwide shipments. Unit shipment growth will be even faster at 24%. In 1983, some 376,000 small-scale systems were shipped worldwide; 62% of these were shipped into the U.S. market.

Small-scale systems are likely to be the first major Unix success story. Already companies such as Altos and NCR have made significant penetration into this market using Unix, and a band of eager start-ups is following. But the availability of quality applications and office automation software continues to be a problem for Unix vendors.

Small systems economics favor Unix. Because of their heavy investments in software and people, many large and medium scale systems users are primarily concerned with installed bases and compatibility. Small-scale systems customers, however, are often new customers and can thus be more price sensitive. This bodes well for Unix, since Unix-based systems are generally based on commercially available microprocessors and thus are considerably less expensive than many proprietary products.

As microprocessors get more complex, the cost advantages inherent in using standard products will become even more pronounced. However, many large customers will be willing to pay a premium for the type of top-to-bottom compatibility that DEC and DG are offering. At this point, very few vendors have had success getting a proprietary operating system to run efficiently on a merchant microprocessor; witness IBM's XT/370. IBM seems to be resisting the temptation to build a single-chip 4300.

Although small-scale systems are feeling heat from PCs, a wholesale retreat is not likely. For many applications, multi-user systems are much more cost effective than giving everyone a PC. Additionally, the local area network market is still so confused and lacking in software that multi-user systems have considerable appeal from a systems management point of view. Both of these advantages will dwindle slowly over time.

Market shares

Because of its sheer breadth of products in this market -- Series 1, S/36, some System 38s, the 4321, and the 8100 -- IBM emerged as the leading small systems vendor in 1983. The strong demand for the System 36 should allow the giant to easily retain its lead in 1984. Similar to the situation in medium scale systems, 14 vendors have between one and seven percent of the small-scale systems market. But unlike the medium-scale business, the top fifteen small system vendors can change significantly from year to year.

Whereas much of the installed base of small-scale systems consists of 16-bit systems, led by products such as the Vax 730, Prime 2550, and DG MV 4000, 32-bit systems have come on strong in 1983 and 1984. But this trend won't become fully dominant until systems based around merchant 32-bit microprocessors have been on the market a few years. The resiliency of the PDP business and the enthusiasm over DEC's J-11 chip shows once again that there are many applications that do not require 32-bit functionality.

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1983 WORLDWIDE SHIPMENTS OF SMALL-SCALE SYSTEMS
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Vendor	Total Sales $ Million Shipments	Total Sales Unit Shipments	Direct Sales $ Million Shipments	Direct Sales % of Total	Direct Sales Unit Shipments	Direct Sales % of Total
IBM	1,881	23,536	1,505	80	17,181	73
DEC	1,195	37,460	359	30	7,492	20
Hewlett-Packard	554	13,177	277	50	5,930	45
Burroughs	431	6,250	409	95	5,625	90
Wang	360	8,907	270	75	6,413	72
NCR	322	5,920	299	93	5,328	90
Texas Instruments	309	11,200	176	57	5,936	53
Data General	276	10,453	41	15	1,045	10
Datapoint	188	9,972	137	73	6,980	70
Prime	162	3,230	118	73	2,229	69
Altos	136	14,785	11	8	739	5
Fortune	99	13,310	18	18	2,130	16
Compupro	91	13,000	9	10	1,300	10
Sperry	89	866	85	95	805	93
Basic 4	87	2,762	65	76	2,044	74
Subtotal	6,180	174,828	3,780	61	71,178	41
Others	2,249	201,259	464	21	45,109	25
TOTAL	8,429	376,087	4,244	50	116,287	22

1983 WORLDWIDE MARKET SHARES FOR SMALL-SCALE SYSTEMS
DOLLARS (Left); UNITS (right)
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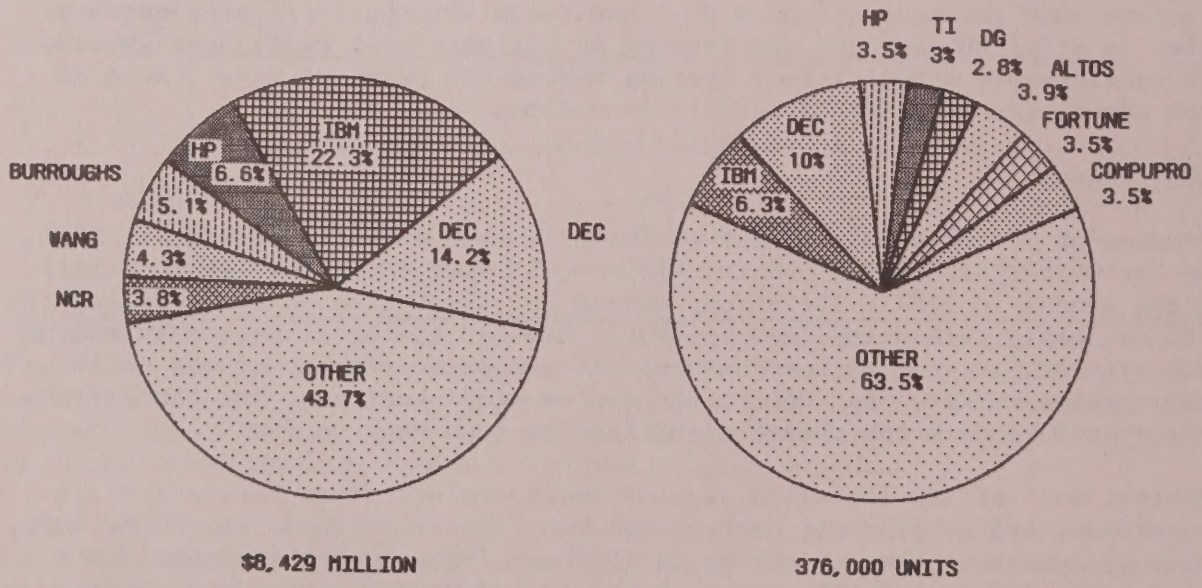

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COMPUTER MARKET SUMMARY -- U.S.-BASED MANUFACTURERS
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	321,640	990,200	17,648	106.4
1979	467,160	1,427,200	23,858	124.3
1980	658,300	2,062,600	23,851	136.4
1981	1,116,980	3,115,700	27,423	150.0
1982	4,145,200	7,215,700	35,138	178.8
1983	7,483,560	14,654,300	43,965	212.2
1984	10,802,000	25,392,900	53,240	250.0
1985	14,187,440	39,506,100	62,925	298.9
1986	16,734,490	56,151,600	74,869	355.3
1987	19,862,340	75,907,500	88,944	423.8
1988	25,186,060	100,966,500	104,610	504.7
		UNITED STATES		
1978	227,000	634,800	11,175	59.5
1979	295,560	913,600	13,718	68.9
1980	439,800	1,337,900	14,203	75.6
1981	773,260	2,078,400	17,285	86.1
1982	3,143,940	5,197,500	22,259	104.5
1983	5,518,230	10,707,000	27,522	125.7
1984	7,897,840	18,568,200	33,556	151.1
1985	10,062,540	28,588,600	40,215	184.1
1986	11,142,930	39,681,000	47,747	222.1
1987	12,501,400	52,121,900	56,274	267.0
1988	15,766,650	67,816,300	66,126	320.3
		INTERNATIONAL		
1978	94,640	355,400	6,473	46.9
1979	171,600	513,600	10,140	55.4
1980	218,500	724,700	9,648	60.8
1981	343,720	1,037,300	10,138	63.9
1982	1,001,260	2,018,200	12,879	74.3
1983	1,965,330	3,947,100	16,443	86.5
1984	2,904,160	6,824,700	19,684	98.9
1985	4,124,900	10,917,500	22,710	114.8
1986	5,591,560	16,470,600	27,122	133.2
1987	7,360,940	23,785,600	32,670	156.8
1988	9,419,410	33,150,200	38,484	184.4

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MEDIUM-SCALE COMPUTER MARKET -- U.S.-BASED MANUFACTURERS
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	11,400	55,700	6,900	34.2
1979	13,900	62,500	7,200	35.2
1980	18,700	76,300	7,700	37.1
1981	22,600	89,800	10,100	40.0
1982	35,300	117,200	9,700	46.4
1983	36,200	140,300	9,500	52.9
1984	39,800	178,300	10,400	59.3
1985	43,700	211,500	11,300	65.9
1986	48,700	247,600	12,400	72.6
1987	54,400	286,900	13,800	79.5
1988	61,000	330,000	15,500	86.8
		UNITED STATES		
1978	6,600	33,000	4,400	17.6
1979	8,600	38,000	4,600	18.1
1980	11,100	46,200	4,900	19.2
1981	13,500	55,700	6,300	21.6
1982	22,300	73,400	6,100	25.3
1983	22,800	87,300	5,900	29.5
1984	25,100	110,400	6,500	33.9
1985	27,600	130,100	7,100	38.5
1986	30,800	151,400	7,800	43.3
1987	34,500	174,500	8,700	48.4
1988	38,900	199,900	9,800	53.9
		INTERNATIONAL		
1978	4,800	22,700	2,500	16.6
1979	5,300	24,500	2,600	17.1
1980	7,600	30,100	2,800	17.9
1981	9,100	34,100	3,800	18.4
1982	13,000	43,800	3,600	21.1
1983	13,400	53,000	3,600	23.4
1984	14,700	67,900	3,900	25.4
1985	16,100	81,400	4,200	27.4
1986	17,900	96,200	4,600	29.3
1987	19,900	112,400	5,100	31.1
1988	22,100	130,100	5,700	32.9

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SMALL-SCALE COMPUTER MARKET -- U.S.-BASED MANUFACTURERS
(Copyright 1984 -- International Data Corporation)

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	131,400	532,600	4,400	25.6
1979	161,400	671,900	5,600	30.1
1980	197,300	851,600	7,300	36.0
1981	247,800	1,045,800	8,200	41.8
1982	315,300	1,325,300	8,900	49.9
1983	376,000	1,671,400	8,400	57.7
1984	477,500	2,089,700	10,000	66.6
1985	610,800	2,639,300	12,300	77.6
1986	767,400	3,333,200	15,000	91.1
1987	941,100	4,186,100	18,000	107.3
1988	1,138,800	5,219,200	21,400	126.7
		UNITED STATES		
1978	88,200	363,900	2,600	14.0
1979	102,500	453,900	3,200	16.7
1980	119,500	560,900	4,300	20.1
1981	147,800	680,400	5,000	23.6
1982	186,200	847,300	5,500	28.8
1983	233,600	1,082,200	5,100	33.9
1984	303,700	1,352,600	6,100	39.5
1985	391,800	1,711,500	7,500	46.5
1986	493,700	2,165,700	9,100	55.0
1987	607,200	2,725,500	10,900	65.2
1988	734,800	3,403,500	13,000	77.4
		INTERNATIONAL		
1978	43,200	168,700	1,800	11.6
1979	58,900	218,000	2,400	13.4
1980	77,800	290,700	3,000	15.9
1981	100,000	365,400	3,200	18.2
1982	129,100	478,000	3,400	21.1
1983	142,400	589,200	3,300	23.8
1984	173,800	737,100	3,900	27.1
1985	219,000	927,800	4,800	31.1
1986	273,700	1,167,500	5,900	36.1
1987	333,900	1,460,600	7,100	42.1
1988	404,000	1,815,700	8,400	49.3

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MINICOMPUTER MARKET -- U.S.-BASED MANUFACTURERS*
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	103,100	407,600	3,170	10.4
1979	124,700	518,400	4,010	14.1
1980	151,000	654,100	5,040	18.8
1981	150,700	786,700	6,480	24.8
1982	176,500	941,400	7,550	32.1
1983	185,500	1,098,800	8,560	40.0
1984	209,200	1,274,600	10,700	49.3
1985	238,800	1,474,100	13,040	60.7
1986	270,700	1,699,400	15,920	74.9
1987	306,700	1,956,000	19,260	92.1
1988	343,100	2,133,300	22,850	108.9
		UNITED STATES		
1978	71,700	277,300	2,000	6.6
1979	82,100	345,500	2,550	8.8
1980	92,100	423,100	3,230	11.8
1981	91,900	499,500	4,080	15.5
1982	114,700	597,000	4,830	20.1
1983	120,600	695,700	5,480	25.1
1984	133,900	804,000	6,850	31.4
1985	150,400	924,700	8,350	38.5
1986	167,800	1,058,500	10,190	47.2
1987	187,100	1,208,700	12,330	58.0
1988	206,200	1,374,100	14,550	67.1
		INTERNATIONAL		
1978	31,400	130,300	1,170	3.8
1979	42,600	172,900	1,460	5.3
1980	58,900	231,000	1,810	7.0
1981	58,800	287,200	2,400	9.3
1982	61,800	344,400	2,720	12.0
1983	64,900	403,100	3,080	14.9
1984	75,300	470,600	3,720	18.4
1985	88,400	549,400	4,560	22.7
1986	102,900	640,900	5,810	28.2
1987	119,600	747,300	7,000	34.9
1988	136,900	759,200	8,300	41.8

* Sales by international manufacturers with U.S.-based sales offices are counted in U.S. totals, but not international. The figures above are based on IDC's old definitions.

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SMALL BUSINESS COMPUTER MARKET -- U.S.-BASED MANUFACTURERS*
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	42,900	113,500	1,840	4.6
1979	55,800	164,900	2,610	7.0
1980	65,700	225,800	3,200	10.0
1981	71,100	291,000	3,530	13.4
1982	73,100	355,600	3,480	16.5
1983	75,700	420,200	3,530	19.5
1984	85,100	490,400	4,050	23.0
1985	98,100	569,530	4,650	26.6
1986	111,100	657,700	5,360	30.5
1987	124,100	755,300	6,170	35.1
1988	138,000	857,200	7,020	40.1
		UNITED STATES		
1978	27,500	73,500	1,160	3.0
1979	30,200	100,000	1,450	4.3
1980	39,300	135,500	2,080	6.2
1981	42,400	173,800	2,100	8.2
1982	41,400	210,000	1,990	9.9
1983	41,500	244,800	1,950	11.6
1984	46,400	282,700	2,240	13.5
1985	54,400	326,400	2,570	15.6
1986	62,500	375,800	2,960	17.8
1987	70,700	430,500	3,410	20.3
1988	77,900	488,200	4,119	23.4
		INTERNATIONAL		
1978	15,400	40,000	680	1.6
1979	25,600	64,900	1,160	2.7
1980	26,400	90,300	1,120	3.8
1981	28,700	117,200	1,430	5.2
1982	31,700	145,600	1,490	6.6
1983	34,200	175,400	1,580	7.9
1984	38,700	207,700	1,810	9.5
1985	43,700	243,100	2,080	11.0
1986	48,400	281,900	2,400	12.7
1987	53,400	324,800	2,760	14.8
1988	60,100	368,993	2,900	16.7

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MEDIUM-SCALE COMPUTER CENSUS

Medium-scale computer systems generally support 17 to 128 users in a normal commercial environment. Included are the IBM 4300 line, the mid-range systems from the Bunch, and the high end of lines from companies such as DEC, DG and Prime. System prices tend to fall in the $100,000 to $1 million range.

MEDIUM-SCALE COMPUTER CENSUS AS OF JANUARY 1, 1984
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NAME OF MANUFACTURER	COMPUTER MODEL	OLD SIZE CLASS	NEW SIZE CLASS	PURCHASE PRICE IN DOLLARS BASIC AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED
Auragen Systems Corp.	4000	SM	M	138	01/83	3	7	10
Basic Four Corporation	700	SB	M	130	08/77	109	99	208
	730	SB	M	124	06/78	530	600	1,130
	MAI 8000 Series (810)	SB	M	150	04/82	622	742	1,364
					TOTAL	1,261	1,441	2,702
BTI	8000	SM	M	175	05/81	41	10	51
Burroughs	2925	A4	M	362	03/83	180	120	300
	4955	A5	M	1,770	08/83	80	25	105
	2500	A4	M	521	02/67	1	3	4
	3500	A4	M	951	05/67	75	50	125
	45/4700	A5	M	1,630	10/71	115	55	170
	55/5700	A5	M	1,756	03/63	0	5	5
	2700	A4	M	554	08/72	30	25	55
	2800	A4	M	462	12/76	160	100	260
	3700	A4	M	1,285	11/72	120	130	250
	3800	A4	M	691	--/77	170	40	210
	4800	A5	M	1,412	09/76	315	110	425
	2900	A4	M	523	07/80	375	220	595
	3955	A4	M	763	09/81	175	40	215
	5930	A5	M	567	01/81	125	155	280
	5920	A5	M	439	--/82	75	40	115
					TOTAL	1,996	1,118	3,114
Cambex	1641	A4	M	175	10/80	7	15	22
	1641-11	A4	M	178	--/83	2	4	6
	1651	A5	M	209	--/82	5	4	9
	1651-11	A5	M	256	--/83	2	0	2
	1636-1	A4	M	100	10/81	7	0	7
	1636-10	A4	M	98	01/83	3	0	3
					TOTAL	26	23	49
Control Data Corp.	Cyber 71	A4	M	977	07/76	0	3	3
	Cyber 171	A4	M	1,161	08/77	4	36	40
	Cyber 72	A5	M	1,891	10/71	4	17	21
	Cyber 170-720	A5	M	1,594	05/79	60	100	160
	Cyber 170-825	A4	M	930	03/82	45	45	90
	Cyber 170-835	A5	M	1,902	03/82	25	25	50
	Cyber 170-815	A4	M	390	01/83	15	30	45
	Cyber 170-845	A5	M	1,600	12/83	25	25	50
	G-20	A4	M	867	04/61	1	0	1
	31/3150	A4	M	438	12/64	15	7	22
	3170	A5	M	1,014	12/70	6	3	9
	3200	A4	M	653	05/64	10	8	18
	3300	A5	M	1,558	09/65	66	21	87
	3400	A5	M	1,065	11/64	2	0	2
	3500	A5	M	1,401	01/69	23	10	33
	Omega 480-1	A4	M	376	06/77	30	0	30
	Omega 480-2	A5	M	384	08/78	50	3	53
	Omega 480-3	A5	M	439	01/80	35	2	37
					TOTAL	416	335	751
Data General	Eclipse S/250	SM	M	150	11/78	635	345	980
	Eclipse C/300, 330	SM	M	150	02/75	800	200	1,000
	Eclipse C/350	SM	M	180	11/78	600	200	800
	Eclipse M/600	SM	M	215	05/78	285	95	380
	Eclipse MV/6000	SM	M	200	02/82	365	155	520
	Eclipse MV/8000	SM	M	300	10/80	600	320	920
	Eclipse MV/10000	SM	M	510	--/83	140	60	200
					TOTAL	3,425	1,375	4,800
Digital Equipment Corp.	PDP-6	A4	M	400	10/64	0	0	0
	VAX-11/750	SM	M	90	--/80	4,700	3,540	8,240
	VAX-11/780	SM	M	210	05/78	5,300	3,550	8,850
	VAX-11/782	SM	M	440	--/82	160	100	260
	PDP-15 XVM	TM	M	82	02/70	550	320	870
	VAX 11/785	SM	M	280	--/84	0	0	0
	1040/50	A4	M	724	10/67	39	17	56
	1060/70	A5	M	899	06/72	65	34	99
	2040/50	A4	M	741	06/76	80	30	110
	2060	A5	M	1,014	07/79	250	130	380
					TOTAL	11,144	7,721	18,865
Digital Scientific Corp.	Meta 4/5030	SM	M	150	06/79	15	1	16
Formation	F/4000	SM	M	134	08/81	50	25	75

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MEDIUM-SCALE COMPUTER CENSUS AS OF JANUARY 1, 1984 (Continued)
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NAME OF MANUFACTURER	COMPUTER MODEL	OLD SIZE CLASS	NEW SIZE CLASS	PURCHASE PRICE IN DOLLARS BASIC AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED
Four Phase Systems	Two PI V/32	SM	M	125	06/78	100	6	106
	System 311	SM	M	265	02/81	155	15	170
	System 312	SM	M	320	12/81	52	8	60
	IV/40-IV/95	P	M	130	--/70	9,500	400	9,900
					TOTAL	9,807	429	10,236
Gould Computer Systems	32/75, 77	SM	M	150	03/78	1,100	269	1,369
	32/87	SM	M	500	11/81	252	55	307
	32/97	SM	M	500	--/84	0	0	0
					TOTAL	1,352	324	1,676
Harris	Slash 7	SM	M	180	10/75	18	1	19
	Series 100	SM	M	190	10/75	37	1	38
	Series 200	SM	M	240	10/75	52	3	55
	Series 1X5	SM	M	175	09/77	117	19	136
	Series 5X0	SM	M	300	12/78	89	9	98
	H80	SM	M	100	02/81	84	28	112
	H100	SM	M	150	01/71	755	33	788
	H300	SM	M	200	09/81	85	17	102
	H500	SM	M	250	01/79	375	81	456
	H800 Series	SM	M	275	03/80	455	55	510
	H700	SM	M	175	03/83	71	14	85
	Mind	P	M	140	08/82	180	85	265
	H600	SM	M	80	08/83	105	24	129
	H60	SM	M	70	05/84	0	0	0
	H1000	SM	M	292	03/84	0	0	0
					TOTAL	2,423	370	2,793
Hewlett-Packard	3000 I, II	SM	M	200	11/72	1,420	880	2,300
	3000 III	SM	M	200	06/78	2,309	989	3,298
	3000-64	SM	M	325	01/82	685	456	1,141
	3000-68	SM	M	375	12/83	60	0	60
	3000-48	SM	M	206	12/83	200	40	240
	1000-A/600	TM	M	20	02/82	4,420	2,940	7,360
	1000-A/700	TM	M	30	02/82	1,104	736	1,840
	1000-A/900	TM	M	50	02/82	1,380	920	2,300
					TOTAL	11,578	6,961	18,539
HIS	(GE) 3010/3012	TM	M	90	05/70	25	1	26
	116/316/416/516	TM	M	62	10/66	2,405	1,295	3,700
	700 Series	TM	M	65	06/72	2,114	1,811	3,925
	6/43,47,53,57,48, 54,74,76	SM	M	174	01/77	6,850	5,471	12,321
	6/92,96	SM	M	541	10/81	225	341	566
	Gamma-30	A4	M	437	02/62	0	0	0
	H-Level 64	A4	M	594	10/74	210	961	1,171
	DPS 7	A4	M	502	--/81	90	487	577
	DPS 8/20	A4	M	552	04/80	55	19	74
	DPS 8/44	A4	M	864	01/80	65	47	112
	DPS 8/47	A4	M	500	03/83	50	25	75
	DPS 8/49	A4	M	800	03/83	20	15	35
	DPS 8/52	A5	M	1,996	11/80	63	59	122
	DPS 8/62	A5	M	2,354	12/81	18	6	24
	DPS 8/44 Dual	A5	M	1,200	--/83	10	3	13
	G-200	A4	M	444	04/61	25	8	33
	G-400	A4	M	732	05/64	45	45	90
	G-6023/25	A5	M	1,557	11/73	7	9	16
	G-6030/40	A5	M	1,986	06/71	12	61	73
	H-125	A4	M	381	12/67	3	17	20
	H-1015/2015	A4	M	841	02/71	8	6	14
	H-1200	A4	M	657	02/66	60	19	79
	H-2040	A4	M	622	04/72	35	26	61
	H-2050/60	A4	M	961	04/72	65	42	107
	H-2200	A4	M	901	01/66	25	6	31
	H-2070	A5	M	1,672	05/72	10	0	10
	H-3200	A5	M	1,275	02/70	30	15	45
	H-4200	A5	M	2,006	09/68	3	1	4
	H-8/1800	A5	M	1,568	12/60	2	0	2
	H-4/1400	A4	M	585	12/61	4	3	7
	Comshare/Xerox	A5	M	612	06/79	15	0	15
	H-64/300	A4	M	404	04/79	105	948	1,053
	H-66/05/07	A4	M	902	10/76	38	86	124
	H-66/10/17	A5	M	1,474	06/75	24	65	89
	H-66/20/27	A5	M	1,986	11/74	64	126	190
	H-66/440/520	A5	M	913	12/79	80	39	119
	6/75	SM	M	155	09/83	10	5	15
	6/95	SM	M	220	09/83	10	7	17
					TOTAL	12,880	12,075	24,955

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NAME OF MANUFACTURER	COMPUTER MODEL	OLD SIZE CLASS	NEW SIZE CLASS	PURCHASE PRICE IN DOLLARS BASIC AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED
IBM	7040/44	A5	M	1,504	06/63	0	1	1
	7070/74	A5	M	1,357	03/68	0	0	0
	4381-2, 1	A5	M	1,000	1Q/84	0	0	0
	4361-4, -5	A4	M	475	2Q/84	0	0	0
	360/30	A4	M	552	06/65	290	105	395
	360/40	A4	M	935	06/65	320	110	430
	360/44	A4	M	920	07/66	17	9	26
	360/50	A5	M	1,620	08/65	130	45	175
	370/125	A4	M	648	06/78	150	400	550
	370/135	A4	M	1,003	05/72	270	275	545
	370/138	A4	M	977	11/76	570	940	1,510
	370/145	A5	M	1,871	07/71	230	220	450
	370/148	A5	M	1,667	03/77	635	615	1,250
	System 38-7	A4	M	397	06/82	900	900	1,800
	System 38-8	A5	M	400	07/83	150	140	290
	4331-2/11	A4	M	387	03/82	1,780	1,440	3,220
	4341-1/9/10	A4	M	814	10/79	5,260	5,150	10,410
	4341-2/11/12	A5	M	950	03/81	3,210	1,850	5,060
	1410	A4	M	836	11/61	4	1	5
	1460	A4	M	481	10/63	5	1	6
	7010	A5	M	1,254	10/63	0	0	0
					TOTAL	13,921	12,202	26,123
IPL	4436	A4	M	172	11/80	17	0	17
	4443	A4	M	218	03/80	40	0	40
	4445	A4	M	2,339	12/82	4	0	4
	4446	A4	M	307	12/81	66	12	78
	4460	A5	M	392	--/83	4	2	6
	4480	A5	M	605	--/83	0	0	0
					TOTAL	131	14	145
Magnuson	M80/3	A4	M	204	01/79	15	1	16
	M80/4	A5	M	324	12/78	28	4	32
	M80/30	A4	M	93	08/81	23	0	23
	M80/30E	A4	M	117	12/81	1	0	1
	M80/31	A4	M	140	06/80	74	7	81
	M80/32	A4	M	184	06/80	145	18	163
	M80/41	A4	M	170	02/82	0	0	0
	M80/42	A4	M	191	03/81	73	9	82
	M80/43	A5	M	249	03/81	61	6	67
					TOTAL	420	45	465
MDS Qantel	64 Series	SB	M	225	04/83	110	25	135
Modular Computer Systems	Modcomp IV	SM	M	100	05/74	339	130	469
	Classic 7870	SM	M	159	08/78	410	155	565
	Classic II/75	SM	M	153	05/82	170	90	260
	Classic II/85	SM	M	300	--/84	0	0	0
					TOTAL	919	375	1,294
NAS	AS/6100	A5	M	465	10/82	3	5	8
	AS/4	A5	M	918	06/77	19	8	27
	AS/3	A4	M	611	11/78	25	31	56
	AS/3000	A4	M	325	01/80	39	0	39
	AS/5000	A5	M	596	02/80	83	55	138
	AS/6620	A5	M	366	--/83	19	9	28
	AS/6630	A5	M	486	--/83	8	33	41
	AS/6650	A5	M	606	--/83	23	18	41
	7020/30	A5	M	820	01/79	0	7	7
					TOTAL	219	166	385
NCR	9300	SB	M	59	--/83	400	200	600
	315 RMC	A4	M	500	09/65	0	0	0
	8635	A4	M	900	--/83	3	7	10
	8645	A5	M	1,420	--/83	0	2	2
	8655	A5	M	1,775	--/83	0	1	1
	8560	A4	M	730	11/77	35	23	58
	8565	A4	M	574	04/79	90	145	235
	8565 II	A4	M	460	04/82	44	54	98
	8570	A4	M	934	05/76	83	76	159
	8575	A4	M	715	04/79	97	70	167
	8580	A5	M	1,700	12/78	4	8	12
	8585	A5	M	1,443	08/79	30	50	80
	8575 II	A5	M	537	05/82	35	38	73
	8585 II	A5	M	574	05/82	19	19	38
	8595 II	A5	M	727	05/82	16	17	33
	Century 200	A4	M	384	09/69	35	35	70
	Century 201	A4	M	617	09/69	55	60	115
	Century 251	A4	M	1,050	11/73	10	15	25
	Century 300	A5	M	1,400	02/72	34	40	74
					TOTAL	990	860	1,850

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MEDIUM-SCALE COMPUTER CENSUS AS OF JANUARY 1, 1984 (Cont.)
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NAME OF MANUFACTURER	COMPUTER MODEL	OLD SIZE CLASS	NEW SIZE CLASS	PURCHASE PRICE IN DOLLARS BASIC AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED
Perkin-Elmer	70	TM	M	65	12/71	1,108	348	1,456
	Cadam	SM	M	220	05/78	75	5	80
	8/32	SM	M	160	06/75	869	284	1,153
	3240	SM	M	192	10/79	318	89	407
	3250/XR	SM	M	190	02/82	126	123	249
	3200MPS	SM	M	300	--/83	25	9	34
					TOTAL	2,521	858	3,379
Prime	500	SM	M	330	06/76	80	40	120
	150 II	SM	M	65	06/80	20	60	80
	550	SM	M	105	02/79	1,025	625	1,650
	550 II	SM	M	110	07/81	525	245	770
	650	SM	M	165	02/79	90	55	145
	750	SM	M	220	07/79	1,120	400	1,520
	850	SM	M	370	07/81	205	80	285
	9950	SM	M	393	08/83	200	115	315
					TOTAL	3,265	1,620	4,885
Sperry Univac	491/492	A5	M	1,700	12/61	0	1	1
	1100/10	A5	M	2,053	04/76	55	131	186
	1100/20	A5	M	2,794	04/75	2	15	17
	1100/60	A5	M	1,903	03/80	520	1,017	1,537
	9400/80	A4	M	554	05/69	111	223	334
	90/40	A4	M	750	06/78	110	151	261
	90/60	A4	M	1,161	01/74	115	128	243
	90/80	A5	M	3,190	12/76	89	53	142
	90/70/9700	A5	M	1,332	08/72	5	18	23
	III	A4	M	1,175	08/62	45	8	53
	301	A4	M	308	10/60	3	0	3
	501	A5	M	726	06/59	0	0	0
	418 I, II	A4	M	470	06/63	28	27	55
	3301	A5	M	1,067	06/64	9	0	9
	418 III	A4	M	1,777	06/69	44	90	134
	Spectra 70/35	A4	M	663	01/67	11	2	13
	Spectra 70/45	A5	M	1,234	11/65	39	0	39
	Spectra 70/46	A5	M	2,051	11/68	0	0	0
	Spectra 70/55	A5	M	1,881	11/68	0	0	0
	Spectra 70/2	A4	M	648	07/71	1	0	1
	Spectra 70/3	A4	M	1,087	10/71	1	0	1
					TOTAL	1,188	1,864	3,052
Stratus Computer	Stratus/32	SM	M	200	02/82	102	40	142
Synapse	N+1	SM	M	340	12/82	5	0	5
Systems Engineering	32/55, 57	SM	M	125	08/75	570	175	745
Tandem	Non Stop, Nonstop II, TXP	SM	M	170	05/76	4,725	1,670	6,395
Wang	VS-100	SB	M	265	01/81	806	630	1,436
	VS-90	SB	M	163	01/82	540	250	790
					TOTAL	1,346	880	2,226
Xerox	Sigma 5	A4	M	585	08/67	63	6	69
	Sigma 6	A4	M	1,030	11/70	12	6	18
	Sigma 7	A5	M	1,223	12/66	25	4	29
	Sigma 8	A4	M	920	09/71	0	0	0
	940	A5	M	1,097	04/66	33	0	33
	550/560	A4	M	631	11/74	17	1	18
					TOTAL	150	17	167
					GRAND TOTAL	87,300	53,000	140,300

Notes: SM = Supermini; SBC = Small Business Computer; TM = Traditional Mini; A5 = General Purpose Size Class 5; A4 = General Purpose Size Class 4.

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SMALL-SCALE COMPUTER CENSUS

Census of top ten small-scale computer vendors, by dollar value of 1983 worldwide shipments. Small-scale computer systems generally range from 2-16 users in typical commercial applications. Representative systems include the IBM S/36, DEC PDP-11 and Vax 730, and systems such as those from Altos. Average systems prices are normally in the $10,000 to $100,000 range.

SMALL-SCALE COMPUTER CENSUS AS OF JANUARY 1, 1984
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Name of Manufacturer	Computer Model	Old Size Class	New Size Class	Average Purchase Price ($K)	Date of 1st Install.	Number Install. in U.S.	Number Install. Outside U.S.	Total Number Installed
IBM	Series 1	TM	S	30	11/76	37,700	14,600	52,300
	System/32	SB	S	42	03/75	4,400	4,250	8,650
	System/34	SB	S	64	12/77	38,000	35,500	73,500
	System/36	SB	S	56	10/83	3,000	1,000	4,000
	8100	p	S	140	08/79	5,980	4,600	10,580
	System 3-4	A2	S	61	06/76	50	25	75
	System 3-6	A2	S	78	12/70	215	55	270
	System 3-8	A2	S	105	06/75	470	625	1,095
	System 3-10	A2	S	120	01/70	1,985	660	2,645
	System 3-12	A3	S	181	03/76	850	860	1,710
	System 3-15	A3	S	334	03/74	2,050	1,030	3,080
	360/20	A3	S	142	12/65	280	115	395
	360/22	A3	S	182	07/71	5	6	11
	360/25	A3	S	409	10/68	17	70	87
	370/115	A3	S	470	04/74	120	530	650
	System 38-3	A2	S	146	07/80	860	770	1,630
	System 38-4	A3	S	157	08/81	1,600	1,430	3,030
	System 38-5	A3	S	293	07/80	4,500	3,410	7,910
	4321, 4331-1	A3	S	225	03/82	4,860	3,450	8,310
	1130	A2	S	125	02/66	460	245	705
	1401	A3	S	186	09/60	210	27	237
	1401 G-H	A2	S	111	05/64	1	0	1
	1440	A3	S	237	04/63	8	3	11
	1620	A3	S	135	09/60	20	11	31
					TOTAL	107,641	73,272	180,913
Digital Equipment Corp.	PDP-8/a, e, f, m	TM	S	15	04/71	45,120	22,930	68,050
	PDP-8/i, l, s	TM	S	27	05/65	5,765	3,685	9,450
	PDP-9, 9L	TM	S	50	12/66	290	160	450
	PDP/LSI-11/03, PDP/LSI-11/23	MM	S	5	06/75	62,300	38,750	101,050
	PDP-11/04, 05,10, 15, 20	TM	S	17	03/70	32,380	18,120	50,500
	PDP-11/24	TM	S	37	10/81	5,700	5,090	10,790
	PDP-11/34, 35, 40	TM	S	40	01/73	35,505	26,350	61,855
	PDP-11/44	TM	S	60	--/80	13,450	8,045	21,495
	PDP-11/45, 50, 55	SM	S	91	04/72	4,550	1,460	6,010
	PDP-11/60	SM	S	75	06/77	1,185	1,085	2,270
	PDP-11/70	SM	S	175	07/75	8,520	3,750	12,270
	VAX-11/730	SM	S	42	06/82	1,400	1,050	2,450
	PDP-12	TM	S	46	04/69	510	225	735
	VAX-11/725	SM	S	30	10/83	200	100	300
	2020	A3	S	326	07/78	220	185	405
					TOTAL	217,095	130,985	348,080
Hewlett-Packard	250	SB	S	28	09/78	2,219	4,259	6,478
	300	SB	S	58	09/78	220	310	530
	2100A	TM	S	15	06/71	7,900	3,400	11,300
	2100S	TM	S	36	08/73	1,825	1,425	3,250
	2114/15/16	TM	S	29	11/66	2,495	1,145	3,640
	1000-M (MX-M, K)	TM	S	25	06/74	8,446	6,597	15,043
	1000-E (MX-E)	TM	S	40	01/77	13,763	13,737	27,500
	1000-F	TM	S	55	09/78	5,661	4,026	9,687
	1000-L, XL	TM	S	10	06/79	1,590	1,360	2,950
	3000-33	SM	S	122	01/79	728	312	1,040
	3000-30	SM	S	80	10/79	1,067	458	1,525
	3000-40	SM	S	100	11/81	1,416	944	2,360
	3000-44	SM	S	170	03/81	2,760	750	3,510
	9020, 9030, 9040	SM	S	35	01/83	2,000	1,200	3,200
	3000-42	SM	S	120	12/83	43	28	71
					TOTAL	52,133	39,951	92,084
Burroughs	880, B90	SB	S	29	11/76	10,240	15,760	26,000
	890	SB	S	33	12/79	0	0	0
	B700	SB	S	68	03/73	1,800	1,500	3,300
	B800	SB	S	51	05/77	5,712	3,208	8,920
	B900	SB	S	76	08/80	2,195	1,105	3,300
	1710	A2	S	145	12/75	190	235	425
	1720	A3	S	366	02/73	120	120	240
	2/3/500	A3	S	329	11/61	65	30	95
	1815/25/30	A2	S	127	05/77	200	360	560
	1855/60/70/85	A3	S	265	05/77	710	225	935
	1905	A2	S	103	04/80	245	140	385
	1955/1985	A3	S	204	04/80	2,105	1,615	3,720
					TOTAL	23,582	24,298	47,880
Wang	2200	SB	S	19	04/73	12,040	9,460	21,500
	2200 SVP, LVP	SB	S	20	09/80	7,380	5,795	13,175
	2200 VP, MVP	SB	S	31	09/76	10,713	8,412	19,125
	VS-80	SB	S	104	07/77	2,434	1,925	4,359
	VS-45	SB	S	85	10/82	800	730	1,530
	VS-25	SB	S	45	12/82	425	365	790
					TOTAL	33,792	26,687	60,479

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SMALL-SCALE COMPUTER CENSUS AS OF JANUARY 1, 1984 (Cont.)
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Name of Manufacturer	Computer Model	Old Size Class	New Size Class	Average Purchase Price ($K)	Date of 1st Install.	Number Install. in U.S.	Number Install. Outside U.S.	Total Number Installed
NCR	Tower 1632	TM	S	28	--/83	840	268	1,108
	8130, 40, 50	SB	S	23	02/77	937	3,600	4,537
	9010	SB	S	18	04/81	180	1,900	2,080
	9020	SB	S	28	03/81	2,330	4,650	6,980
	8200,30/31,50/51	SB	S	55	09/74	5,950	6,900	12,850
	8270	A2	S	91	11/79	435	660	1,095
	8350	A2	S	161	07/77	32	3	35
	8370	A3	S	281	07/78	4	0	4
	8410	A2	S	157	02/79	135	220	355
	8430	A3	S	259	06/78	75	240	315
	8450	A3	S	378	11/77	115	120	235
	8455	A3	S	270	04/79	187	340	527
	8555	A3	S	434	04/79	240	230	470
	8545 II	A3	S	329	04/82	24	45	69
	8550	A3	S	621	04/76	150	105	255
	8555 II	A3	S	418	04/82	150	175	325
	8535 II	A3	S	230	04/82	30	48	78
	9040	A2	S	120	05/81	375	1,330	1,705
	9050	A2	S	150	05/81	151	255	406
	Century 50	A2	S	84	02/71	50	55	105
	Century 75	A2	S	119	07/76	15	20	35
	Century 100	A3	S	164	09/68	55	45	100
	Century 101	A3	S	210	10/72	180	230	410
	Century 151	A3	S	302	02/75	70	85	155
	315/315/100	A3	S	0	05/62	0	1	1
					TOTAL	12,710	21,525	34,235
Texas Instruments	960-A/B	TM	S	30	12/71	4,000	1,900	5,900
	980-A/B	SM	S	40	10/72	4,050	1,800	5,850
	990/4	MM	S	8	06/76	8,255	2,960	11,215
	990/10	TM	S	23	03/76	21,315	9,695	31,010
	990/5	MM	S	10	03/79	7,485	3,140	10,625
	990/12	SM	S	52	11/79	4,180	2,875	7,055
	200	MM	S	9	08/82	275	200	475
	300	TM	S	14	01/83	2,700	1,500	4,200
	600	SM	S	40	08/82	2,400	1,225	3,625
	800	SM	S	54	01/83	500	270	770
					TOTAL	55,160	25,565	80,725
Data General	MP 100, 200, MPT 100	MM	S	3	05/79	1,000	300	1,300
	Micronova	MM	S	4	11/79	3,200	1,300	4,500
	Nova	TM	S	12	02/69	800	400	1,200
	Nova 2 Series	TM	S	10	10/73	7,280	2,720	10,000
	Nova 3/4	TM	S	10	01/76	3,395	2,005	5,400
	Nova 3/12	TM	S	18	01/76	16,470	5,180	21,650
	Nova 3/D	TM	S	36	10/76	2,340	2,140	4,480
	Nova 4/C, S, X	TM	S	20	03/79	13,600	8,900	22,500
	Nova 800/820	TM	S	40	03/71	1,620	580	2,200
	Nova 830/840	SM	S	44	07/73	520	280	800
	Nova 1200 Series	TM	S	11	12/70	10,870	4,130	15,000
	Supernova SC	TM	S	27	04/70	140	60	200
	Eclipse S100, 130, 140, AP/130	SM	S	30	02/75	5,950	3,005	8,955
	Eclipse S200, 230	SM	S	55	02/75	4,240	1,480	5,720
	Eclipse C/150	SM	S	120	12/78	500	300	800
	Eclipse MV/4000	SM	S	70	12/82	400	200	600
	DCC-112	TM	S	12	08/70	900	500	1,400
	DCC-116	TM	S	10	11/71	9,600	1,700	11,300
	DCC-416/616	TM	S	7	09/75	180	20	200
	DCC-Model 5	TM	S	6	02/76	90	10	100
	Desktop Generation 20, 30	DT	S	8	10/83	420	80	500
	S120	TM	S	20	--/82	630	400	1,030
	Eclipse 280	SM	S	90	--/83	300	200	500
	S 20	TM	S	12	--/82	1,000	500	1,500
					TOTAL	85,445	36,390	121,835
Datapoint	8800	P	S	40	03/80	3,386	1,000	4,386
	8600, 8625, 8635	P	S	17	04/81	6,211	2,000	8,211
	6600	P	S	10	--/72	7,500	2,500	10,000
					TOTAL	17,097	5,500	22,597
Prime	100	TM	S	12	04/73	310	560	870
	200	TM	S	22	11/72	430	210	640
	300	SM	S	58	09/73	460	350	810
	400	SM	S	207	06/76	220	180	400
	250 II	SM	S	75	06/80	310	730	1,040
	350	SM	S	116	07/78	200	120	320
	450	SM	S	75	02/79	300	120	420
	2250	SM	S	50	10/82	2,300	1,100	3,400
					TOTAL	4,530	3,370	7,900

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• DATAPOINT FUTURE DEBATED. After lopping off one plant and 240 employees in Fort Worth, Datapoint still faces an uncertain future; rumors are rife concerning a takeover bid. Asher B. Edelman, the New York investor, has confirmed that he and surrogates have purchased 8% of Datapoint stock with a view towards sale, a leveraged buyout, merger, or liquidation. The most noteworthy example of Edelman's recent interest in computer-related companies has been the dismemberment of Mohawk Data Sciences Corp.

• LEADING EDGE/MITSUBISHI MARRIAGE ON ROCKS. The $1.05 billion suit brought by Leading Edge against its personal computer supplier is another aftershock from IBM's price slashing. Leading Edge wanted Mitsubishi to cut its price to them to correspond to the new retail price tags they initiated to compete with IBM. Mitsubishi balked. Leading Edge held up checks. Mitsubishi held up PCs. Both are in court. Leading Edge deposes that Mitsubishi's intent is to void the contract and market PCs under its own name; Sperry, whose PC is built by Mitsubishi to its specifications, sees no imminent threat.

• SEMICONDUCTOR SQUEEZE CLAIMS VICTIMS. First Honeywell responded to the increasingly weak semiconductor market by announcing plans to sell Synertek Inc., its semiconductor subsidiary, and laying off most of its 1700 employees. Then Texas Instruments asked over 2,000 workers to punch out from semiconductor production. Intel meanwhile is sticking to its knitting; witness the decision to sell its System 2000 Data Base Management System to SAS Institute Inc.

• TRILOGY TRIES TO REPOSITION ITSELF. Chairman Gene Amdahl has relinquished CEO responsibilities in favor of Henry C. Montgomery, the company's president, as Trilogy seeks to redefine itself amid the wreckage of its abortive supercomputer/superchip projects. The company announced plans to acquire California Devices, Inc., a semiconductor manufacturer, as "part of Trilogy's new strategic plan to focus on extending the company's strong technology base through the addition of outside product and marketing capabilities and the enhanced utilization of Trilogy's facilities."

• EXXON SEEKS BUYER FOR OFFICE SYSTEMS. Oil and computers don't necessarily mix, at least when major financial commitments are necessary and oil revenues remain squishy soft.

• NBI INC. ENGORGES COMMERCIAL OFFICE PRODUCTS CO. AND ISI. Viewing itself as a potential office automation giant, NBI has acquired within a week both Commercial Office Products, a distributor of office supplies and furniture, and Integrated Solutions Inc., a manufacturer of Unix-based computer systems.

• DECTALK SPEAKS ON ELECTRONIC MAIL. Digital's All-In-One office system took an important step toward becoming all-in-one in actuality with the introduction of Dectalk Mail Access, which allows Dectalk's synthesized voice to read aloud (e.g., over a phone) messages written into the system.

• PERIPHERAL VISION BLURS AT BOTTOM LINE. Add to the roster of computer equipment producers inscribed in red ink the names of Applied Data Communications (3rd quarter) and General Automation Inc. (1st quarter, down over $1.225 million). On a cheerier note, Data Access Systems has come out of Chapter 11 proceedings with net income of over $3.6 million, its first profits since 1978.

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REVIEW & FORECAST
Part III

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

MOLLY UPTON, EDITOR DEC. 12, 1984 ● VOL.20, NO.15,16 P.J. MCGOVERN, PUBLISHER

IDC INTERNATIONAL DATA CORPORATION

COMPUTER SYSTEM SHIPMENT VALUE TO GROW 21% IN 1984; MOMENTUM SHOULD CARRY INTO 1985

Thanks to a strong economy, most of the computer industry is having an excellent 1984. Outside of some of the minor PC players and certain members of the Bunch, growth has been widespread and sustained. This is especially true for the minicomputer vendors whose results are up considerably over 1983.

Although the economy is clearly slowing and semiconductor demand has dropped significantly, IDC expects only a slight slowdown (18.2% growth) in 1985. A key question is whether the transition to major new products such as IBM's Sierra and PC AT and DEC's VAX 8600 can be handled smoothly. At this point most of the industry's major players are reporting reasonable backlogs.

Numerically, IDC estimates that the value of worldwide 1984 shipments will total some $53.2 billion, up 21.2% over the $43.9 billion shipped in 1983. IDC forecasts that the total value of computer system shipments will grow at a compound annual rate of 18.7% over the 1984-1989 period when they will reach a staggering $122 billion, a figure that does not include considerable software, service, and maintenance revenues. Only 16 countries in the world had a 1983 GNP of over $122 billion. Some points of note:

- IBM's share. Despite its solid performance, IBM's share of the market fell considerably in 1983. In 1983, IBM accounted for 38.5% of the value of worldwide shipments, down from 47% in 1982. EDP/IR expects that IBM's share will fall a little more in 1984.

- Relative sectors. According to IDC's new processor classifications (explained inside), 1983's $43.9 billion in worldwide shipments broke down as follows: PCs, 32.9%; small systems, 21.6%; medium systems, 19.1%; and large systems, 26.4%. Five-year growth rates are forecasted at 30%, 20%, 10%, and 9% respectively.

- Wide open middle. Since IBM dominates both the PC and mainframe ends of the market, much of the competitive activity will be focused in the small and medium systems sector of the market where in 1983 IBM and DEC were relatively equal.

- Alliances. Both 1983 and 1984 have seen lots of cooperative agreements, as companies try to stretch their R&D dollars.

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DOLLAR VALUE OF U.S. COMPUTER SYSTEM SHIPMENTS, 1978-1987
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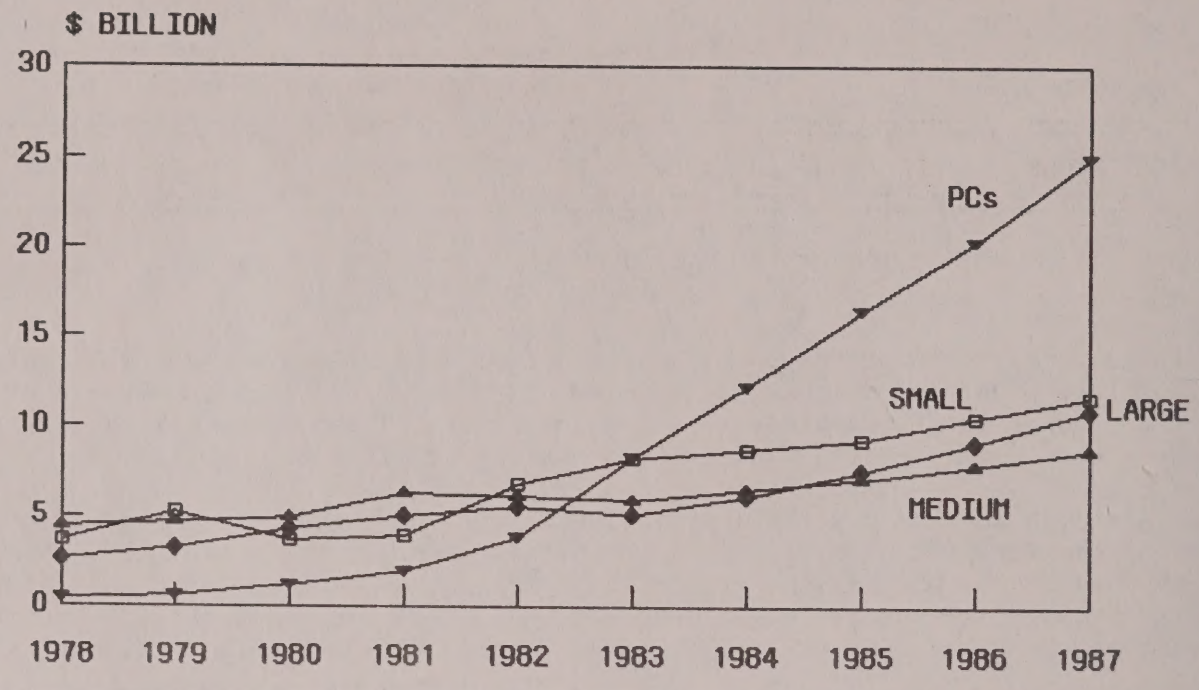

VALUE OF 1983 WORLDWIDE COMPUTER SYSTEM SHIPMENTS
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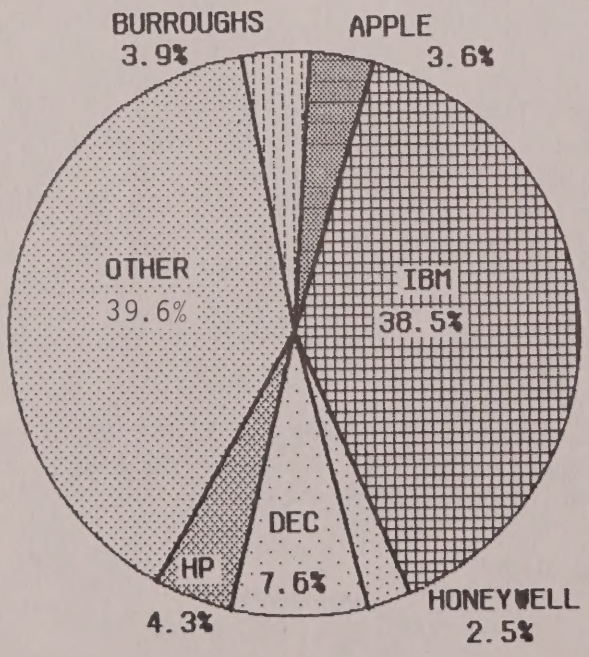
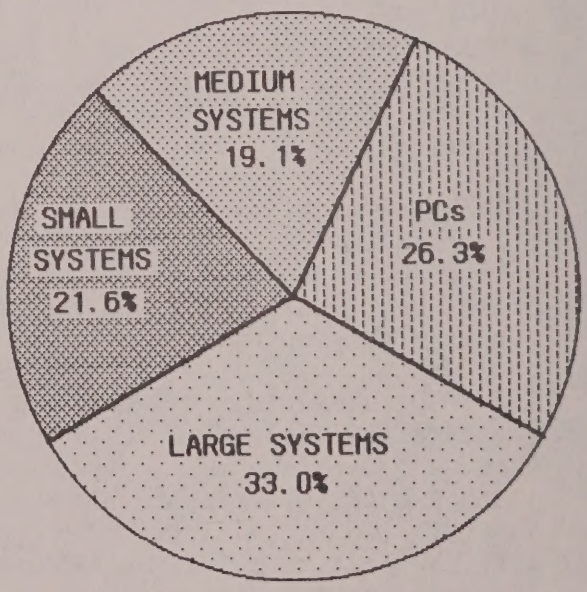


$44 BILLION



$44 BILLION

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ABOUT THE NEW DEFINITIONS

Long time readers of the Gray Sheet will notice significant changes in the way IDC is presenting its data this year. Over the last few years, the mainstay IDC classifications -- General Purpose Computers, Minicomputers, and Small Business Computers -- have become increasingly obsolete. Much as IBM has had to overhaul its operating systems every ten years or so, IDC had to change its market analysis architecture to keep pace with the industry's changing technology and distribution channels.

The old classification scheme presented many problems. For instance, the IBM 4300s and Vax 780 were in different categories even though these systems often compete head on. Similarly, as the traditional minicomputer vendors increased their emphasis on packaged systems sold direct to end users, the line between small business computers and minis had become altogether too fuzzy.

The new classifications -- small, medium, and large scale systems -- are based on IDC's perception of competitive positioning. Obviously, in a market as diverse as today's computer industry, no one criteria will comfortably place the more than 1,000 systems represented in IDC's census tables. But in understanding IDC's classifactions, it is best to keep in mind the following simple guidelines:

- Small-Scale Systems. These systems generally range from 2-16 users in typical commercial applications. Representative systems include the IBM S/36, DEC PDP-11 and Vax 730, and systems such as those from Altos. Average systems prices are normally in the $10,000 to $100,000 range. An attempt has been made to weed out those board-level products that were included in the old minicomputer category.

- Medium-Scale systems. These systems generally support from 17 to 128 users in a normal commercial environment. Included are the IBM 4300 line, the mid-range systems from the Bunch companies, and the high end of the lines from companies such as DEC, DG, and Prime. System prices tend to fall in the $100,000 to $1 Million range.

- Large-Scale systems. These are the very largest computers available from the traditional mainframe vendors. Large systems are expected to support more than 128 users in many commercial environments and have average prices of more than $1 Million. Representative systems include the IBM 308X, Sperry 1100/90, and Burroughs 7900, as well as supercomputers from Cray and CDC.

Since there are no hard rules to follow, border disputes -- i.e., the line between small and medium, and between medium and large -- are inevitable. But overall, the new definitions provide a much more appropriate framework to view the middle of today's market, especially the battle between IBM and DEC. Much as new software is often followed by improved releases, IDC recognizes that these definitions will go through a process of evolution and refinement.

As old issues are resolved, new ones continue to emerge. Methods are needed to compare networked PCs to mult-iuser systems. Additionally, multiprocessor systems, such as those from Tandem, are often bid directly against large scale systems. These difficulties will eventually be addressed, but for the time being, the reader should just keep them in mind while using IDC's data.

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Medium-scale systems

IDC's new medium-scale system category consists primarily of most of the old supermini class as well as size classes four and five (i.e., IBM 4361,81) of the general purpose category. Current systems are usually in the one to five MIPS range, but are offered at a wide array of prices.

The new category is thus a merger of some fast growth products (from the mini vendors) with some slow-to-no growth products (from IBM and the Bunch). Thus the overall 10% medium-scale growth rate expected in 1984 actually masks some very strong performances by DEC, DG, Prime and others, as well as some fairly poor performances by most of the Bunch companies in this area. These offsetting effects will be a significant factor in this market over the entire five-year forecast period.

This clash is symbolized by the battle between IBM and DEC. As the IDC data shows (opposite), in 1983 DEC actually outsold IBM in this market. This, however, is due to the fact that, caught between product cycles, IBM had a very poor year for 4300 sales in 1983. The availability of the 4361 and 4381 should improve the situation in 1984, but given DEC's strong VAX shipments this year, the mini king is still likely to come out on top.

From a performance point of view it is interesting to examine the relationship between medium and large scale systems. Back in 1978, two very significant products were introduced -- the IBM 3033U, and the VAX 11/780. The former had approximately five times the power of the latter. When IBM introduced its 308X series it became capable of offering (through the 3084) 30 times the power of a /780. DEC's new 8600 cuts the IBM lead to about 7-fold, but the new Sierra series should bring it back up into the 14-fold range.

The point of all this is that IBM's mainframe raw performance continues to easily outdistance what the supermini vendors can offer. It's only in pricing where the traditional supermini vendors can claim significant advantages.

Exactly the opposite is the case on the frontier between small and medium scale systems. In terms of absolute performance levels, medium scale systems should be able to easily retain a ten-fold edge over small-scale systems, but on a cost per MIPS basis they will continue to lag behind.

Market shares

Once one gets beyond DEC and IBM, the medium-scale systems market becomes a real dogfight, with no less than thirteen vendors having between one and seven percent of the market. Although Burroughs, Sperry and Honeywell show up in 1983's top six, at current growth rates this will change quickly with Tandem, Data General and Prime all ready to step on by. The Bunch vendors are, however, trying to protect their turf by OEMing more competitive systems that are often Unix based. Whether the Bunch can market these products in significant quan- tities remains to be seen.

Unix is also important to the old supermini crowd, but in a different way. As a rule, the larger vendors are still looking at Unix as a necessary evil. It's the smaller vendors -- Harris, Gould, PE and others -- which often lack applications software and some commercial operating system features -- that are showing the most enthusiasm for Unix.

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1983 WORLDWIDE SHIPMENTS OF MEDIUM-SCALE SYSTEMS
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Vendor	Total Sales $ Million Shipments	Total Sales Unit Shipments	Direct Sales $ Million Shipments	Direct Sales % of Total	Direct Sales Unit Shipments	Direct Sales % of Total
DEC	1,631	8,939	1,272	78	6,257	70
IBM	1,104	3,965	1,060	96	3,648	92
Hewlett-Packard	647	8,471	518	80	5,760	68
Burroughs	623	796	623	100	796	100
Honeywell	568	2,579	500	88	1,934	75
Sperry	534	592	523	98	562	95
Tandem	383	1,954	268	70	1,231	63
Data General	358	1,490	233	65	820	55
Prime	343	1,000	268	78	700	70
Four-Phase	211	1,627	190	90	1,383	85
Harris	190	910	160	84	746	82
Wang	173	696	171	99	682	98
Basic Four	123	820	111	90	705	86
NCR	119	766	119	100	766	100
Subtotal	7,007	34,605	6,015	86	25,991	75
Others	2,549*	1,637	1,964	77	1120	68
TOTAL	9,556	36,242	7,979	83	27,111	75

*Includes third party peripherals.

WORLDWIDE 1983 MARKET SHARES FOR MEDIUM SCALE SYSTEMS
DOLLARS (Left); UNITS (Right)
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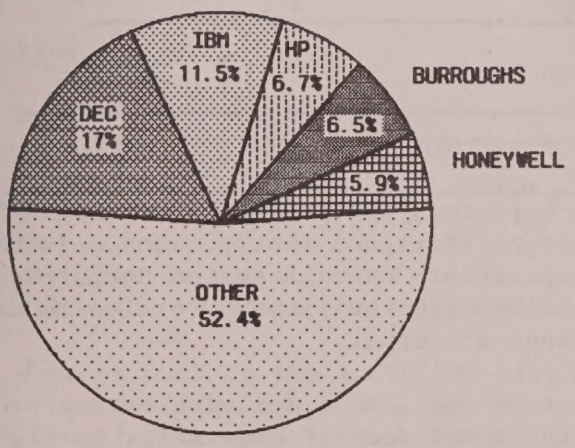
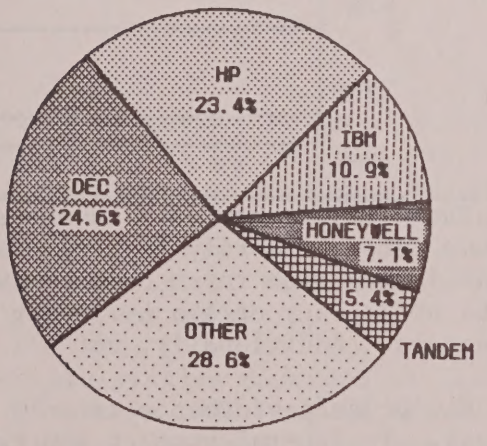


$9,556 MILLION



36,242 UNITS

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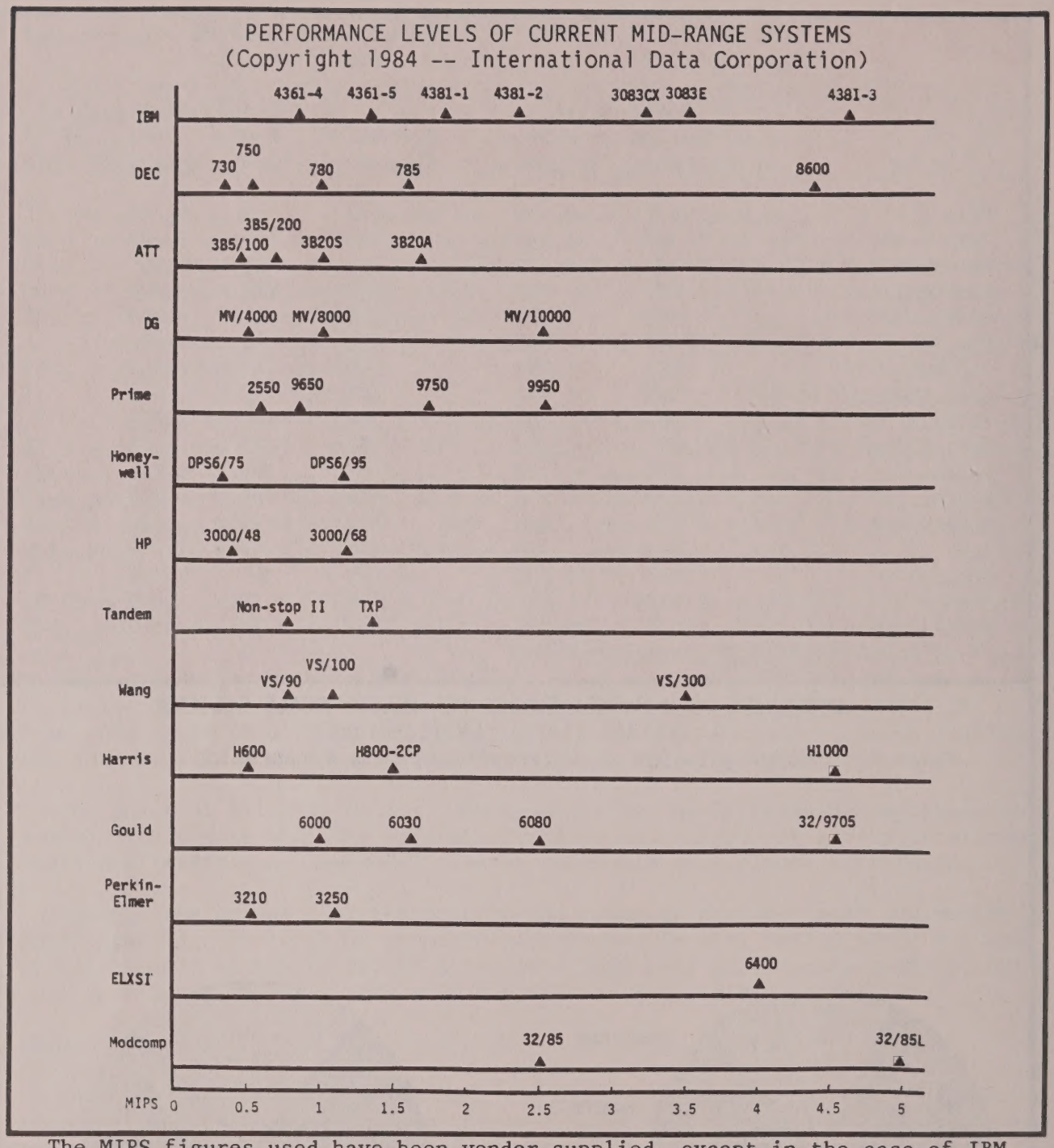

The MIPS figures used have been vendor supplied, except in the case of IBM. They refer primarily to millions of Whetstone (Fortran) instructions. Internal instruction rates do not always translate into overall system performance. The efficiency of the operating system and the I/O facilities are also major factors. Additionally, not all instructions are equal.

Raw price/performance is only one aspect of the user's decision-making process. Peripheral support and capacity, the total cost of ownership, development tools, third-party products, software pricing, languages supported, expandability, communications, service, support, and training are all important ingredients. As is the case in the mainframe world, conversion from one vendor to another is often a difficult process.

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Small-Scale Systems

The small-scale systems market also includes both fast and slow growth sectors. (In this case, the former minicomputer and small business computer markets, respectively.) But here the net result is an overall expansion of 20% per year over the 1983-1989 in terms of the value of worldwide shipments. Unit shipment growth will be even faster at 24%. In 1983, some 376,000 small-scale systems were shipped worldwide; 62% of these were shipped into the U.S. market.

Small-scale systems are likely to be the first major Unix success story. Already companies such as Altos and NCR have made significant penetration into this market using Unix, and a band of eager start-ups is following. But the availability of quality applications and office automation software continues to be a problem for Unix vendors.

Small systems economics favor Unix. Because of their heavy investments in software and people, many large and medium scale systems users are primarily concerned with installed bases and compatibility. Small-scale systems customers, however, are often new customers and can thus be more price sensitive. This bodes well for Unix, since Unix-based systems are generally based on commercially available microprocessors and thus are considerably less expensive than many proprietary products.

As microprocessors get more complex, the cost advantages inherent in using standard products will become even more pronounced. However, many large customers will be willing to pay a premium for the type of top-to-bottom compatibility that DEC and DG are offering. At this point, very few vendors have had success getting a proprietary operating system to run efficiently on a merchant microprocessor; witness IBM's XT/370. IBM seems to be resisting the temptation to build a single-chip 4300.

Although small-scale systems are feeling heat from PCs, a wholesale retreat is not likely. For many applications, multi-user systems are much more cost effective than giving everyone a PC. Additionally, the local area network market is still so confused and lacking in software that multi-user systems have considerable appeal from a systems management point of view. Both of these advantages will dwindle slowly over time.

Market shares

Because of its sheer breadth of products in this market -- Series 1, S/36, some System 38s, the 4321, and the 8100 -- IBM emerged as the leading small systems vendor in 1983. The strong demand for the System 36 should allow the giant to easily retain its lead in 1984. Similar to the situation in medium scale systems, 14 vendors have between one and seven percent of the small-scale systems market. But unlike the medium-scale business, the top fifteen small system vendors can change significantly from year to year.

Whereas much of the installed base of small-scale systems consists of 16-bit systems, led by products such as the Vax 730, Prime 2550, and DG MV 4000, 32-bit systems have come on strong in 1983 and 1984. But this trend won't become fully dominant until systems based around merchant 32-bit microprocessors have been on the market a few years. The resiliency of the PDP business and the enthusiasm over DEC's J-11 chip shows once again that there are many applications that do not require 32-bit functionality.

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1983 WORLDWIDE SHIPMENTS OF SMALL-SCALE SYSTEMS
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Vendor	Total Sales $ Million Shipments	Total Sales Unit Shipments	Direct Sales $ Million Shipments	Direct Sales % of Total	Direct Sales Unit Shipments	Direct Sales % of Total
IBM	1,881	23,536	1,505	80	17,181	73
DEC	1,195	37,460	359	30	7,492	20
Hewlett-Packard	554	13,177	277	50	5,930	45
Burroughs	431	6,250	409	95	5,625	90
Wang	360	8,907	270	75	6,413	72
NCR	322	5,920	299	93	5,328	90
Texas Instruments	309	11,200	176	57	5,936	53
Data General	276	10,453	41	15	1,045	10
Datapoint	188	9,972	137	73	6,980	70
Prime	162	3,230	118	73	2,229	69
Altos	136	14,785	11	8	739	5
Fortune	99	13,310	18	18	2,130	16
Compupro	91	13,000	9	10	1,300	10
Sperry	89	866	85	95	805	93
Basic 4	87	2,762	65	76	2,044	74
Subtotal	6,180	174,828	3,780	61	71,178	41
Others	2,249	201,259	464	21	45,109	25
TOTAL	8,429	376,087	4,244	50	116,287	22

1983 WORLDWIDE MARKET SHARES FOR SMALL-SCALE SYSTEMS
DOLLARS (Left); UNITS (right)
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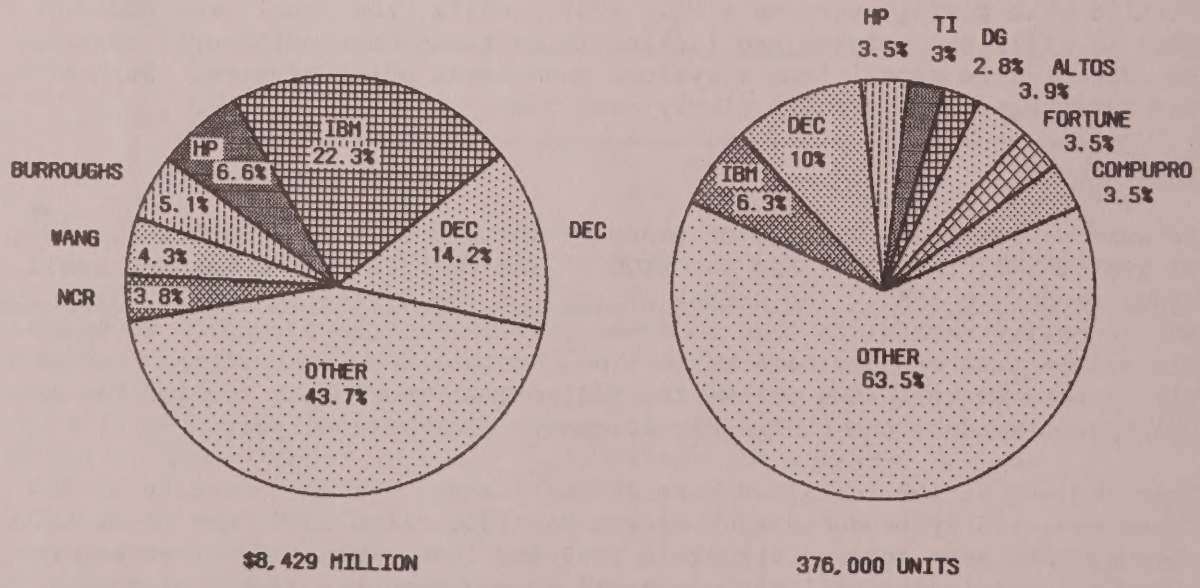

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COMPUTER MARKET SUMMARY -- U.S.-BASED MANUFACTURERS
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	321,640	990,200	17,648	106.4
1979	467,160	1,427,200	23,858	124.3
1980	658,300	2,062,600	23,851	136.4
1981	1,116,980	3,115,700	27,423	150.0
1982	4,145,200	7,215,700	35,138	178.8
1983	7,483,560	14,654,300	43,965	212.2
1984	10,802,000	25,392,900	53,240	250.0
1985	14,187,440	39,506,100	62,925	298.9
1986	16,734,490	56,151,600	74,869	355.3
1987	19,862,340	75,907,500	88,944	423.8
1988	25,186,060	100,966,500	104,610	504.7
		UNITED STATES		
1978	227,000	634,800	11,175	59.5
1979	295,560	913,600	13,718	68.9
1980	439,800	1,337,900	14,203	75.6
1981	773,260	2,078,400	17,285	86.1
1982	3,143,940	5,197,500	22,259	104.5
1983	5,518,230	10,707,000	27,522	125.7
1984	7,897,840	18,568,200	33,556	151.1
1985	10,062,540	28,588,600	40,215	184.1
1986	11,142,930	39,681,000	47,747	222.1
1987	12,501,400	52,121,900	56,274	267.0
1988	15,766,650	67,816,300	66,126	320.3
		INTERNATIONAL		
1978	94,640	355,400	6,473	46.9
1979	171,600	513,600	10,140	55.4
1980	218,500	724,700	9,648	60.8
1981	343,720	1,037,300	10,138	63.9
1982	1,001,260	2,018,200	12,879	74.3
1983	1,965,330	3,947,100	16,443	86.5
1984	2,904,160	6,824,700	19,684	98.9
1985	4,124,900	10,917,500	22,710	114.8
1986	5,591,560	16,470,600	27,122	133.2
1987	7,360,940	23,785,600	32,670	156.8
1988	9,419,410	33,150,200	38,484	184.4

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MEDIUM-SCALE COMPUTER MARKET -- U.S.-BASED MANUFACTURERS
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	11,400	55,700	6,900	34.2
1979	13,900	62,500	7,200	35.2
1980	18,700	76,300	7,700	37.1
1981	22,600	89,800	10,100	40.0
1982	35,300	117,200	9,700	46.4
1983	36,200	140,300	9,500	52.9
1984	39,800	178,300	10,400	59.3
1985	43,700	211,500	11,300	65.9
1986	48,700	247,600	12,400	72.6
1987	54,400	286,900	13,800	79.5
1988	61,000	330,000	15,500	86.8
		UNITED STATES		
1978	6,600	33,000	4,400	17.6
1979	8,600	38,000	4,600	18.1
1980	11,100	46,200	4,900	19.2
1981	13,500	55,700	6,300	21.6
1982	22,300	73,400	6,100	25.3
1983	22,800	87,300	5,900	29.5
1984	25,100	110,400	6,500	33.9
1985	27,600	130,100	7,100	38.5
1986	30,800	151,400	7,800	43.3
1987	34,500	174,500	8,700	48.4
1988	38,900	199,900	9,800	53.9
		INTERNATIONAL		
1978	4,800	22,700	2,500	16.6
1979	5,300	24,500	2,600	17.1
1980	7,600	30,100	2,800	17.9
1981	9,100	34,100	3,800	18.4
1982	13,000	43,800	3,600	21.1
1983	13,400	53,000	3,600	23.4
1984	14,700	67,900	3,900	25.4
1985	16,100	81,400	4,200	27.4
1986	17,900	96,200	4,600	29.3
1987	19,900	112,400	5,100	31.1
1988	22,100	130,100	5,700	32.9

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SMALL-SCALE COMPUTER MARKET -- U.S.-BASED MANUFACTURERS
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	131,400	532,600	4,400	25.6
1979	161,400	671,900	5,600	30.1
1980	197,300	851,600	7,300	36.0
1981	247,800	1,045,800	8,200	41.8
1982	315,300	1,325,300	8,900	49.9
1983	376,000	1,671,400	8,400	57.7
1984	477,500	2,089,700	10,000	66.6
1985	610,800	2,639,300	12,300	77.6
1986	767,400	3,333,200	15,000	91.1
1987	941,100	4,186,100	18,000	107.3
1988	1,138,800	5,219,200	21,400	126.7
		UNITED STATES		
1978	88,200	363,900	2,600	14.0
1979	102,500	453,900	3,200	16.7
1980	119,500	560,900	4,300	20.1
1981	147,800	680,400	5,000	23.6
1982	186,200	847,300	5,500	28.8
1983	233,600	1,082,200	5,100	33.9
1984	303,700	1,352,600	6,100	39.5
1985	391,800	1,711,500	7,500	46.5
1986	493,700	2,165,700	9,100	55.0
1987	607,200	2,725,500	10,900	65.2
1988	734,800	3,403,500	13,000	77.4
		INTERNATIONAL		
1978	43,200	168,700	1,800	11.6
1979	58,900	218,000	2,400	13.4
1980	77,800	290,700	3,000	15.9
1981	100,000	365,400	3,200	18.2
1982	129,100	478,000	3,400	21.1
1983	142,400	589,200	3,300	23.8
1984	173,800	737,100	3,900	27.1
1985	219,000	927,800	4,800	31.1
1986	273,700	1,167,500	5,900	36.1
1987	333,900	1,460,600	7,100	42.1
1988	404,000	1,815,700	8,400	49.3

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MINICOMPUTER MARKET -- U.S.-BASED MANUFACTURERS*
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	103,100	407,600	3,170	10.4
1979	124,700	518,400	4,010	14.1
1980	151,000	654,100	5,040	18.8
1981	150,700	786,700	6,480	24.8
1982	176,500	941,400	7,550	32.1
1983	185,500	1,098,800	8,560	40.0
1984	209,200	1,274,600	10,700	49.3
1985	238,800	1,474,100	13,040	60.7
1986	270,700	1,699,400	15,920	74.9
1987	306,700	1,956,000	19,260	92.1
1988	343,100	2,133,300	22,850	108.9
		UNITED STATES		
1978	71,700	277,300	2,000	6.6
1979	82,100	345,500	2,550	8.8
1980	92,100	423,100	3,230	11.8
1981	91,900	499,500	4,080	15.5
1982	114,700	597,000	4,830	20.1
1983	120,600	695,700	5,480	25.1
1984	133,900	804,000	6,850	31.4
1985	150,400	924,700	8,350	38.5
1986	167,800	1,058,500	10,190	47.2
1987	187,100	1,208,700	12,330	58.0
1988	206,200	1,374,100	14,550	67.1
		INTERNATIONAL		
1978	31,400	130,300	1,170	3.8
1979	42,600	172,900	1,460	5.3
1980	58,900	231,000	1,810	7.0
1981	58,800	287,200	2,400	9.3
1982	61,800	344,400	2,720	12.0
1983	64,900	403,100	3,080	14.9
1984	75,300	470,600	3,720	18.4
1985	88,400	549,400	4,560	22.7
1986	102,900	640,900	5,810	28.2
1987	119,600	747,300	7,000	34.9
1988	136,900	759,200	8,300	41.8

* Sales by international manufacturers with U.S.-based sales offices are counted in U.S. totals, but not international. The figures above are based on IDC's old definitions.

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SMALL BUSINESS COMPUTER MARKET -- U.S.-BASED MANUFACTURERS*
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1978	42,900	113,500	1,840	4.6
1979	55,800	164,900	2,610	7.0
1980	65,700	225,800	3,200	10.0
1981	71,100	291,000	3,530	13.4
1982	73,100	355,600	3,480	16.5
1983	75,700	420,200	3,530	19.5
1984	85,100	490,400	4,050	23.0
1985	98,100	569,530	4,650	26.6
1986	111,100	657,700	5,360	30.5
1987	124,100	755,300	6,170	35.1
1988	138,000	857,200	7,020	40.1
		UNITED STATES		
1978	27,500	73,500	1,160	3.0
1979	30,200	100,000	1,450	4.3
1980	39,300	135,500	2,080	6.2
1981	42,400	173,800	2,100	8.2
1982	41,400	210,000	1,990	9.9
1983	41,500	244,800	1,950	11.6
1984	46,400	282,700	2,240	13.5
1985	54,400	326,400	2,570	15.6
1986	62,500	375,800	2,960	17.8
1987	70,700	430,500	3,410	20.3
1988	77,900	488,200	4,119	23.4
		INTERNATIONAL		
1978	15,400	40,000	680	1.6
1979	25,600	64,900	1,160	2.7
1980	26,400	90,300	1,120	3.8
1981	28,700	117,200	1,430	5.2
1982	31,700	145,600	1,490	6.6
1983	34,200	175,400	1,580	7.9
1984	38,700	207,700	1,810	9.5
1985	43,700	243,100	2,080	11.0
1986	48,400	281,900	2,400	12.7
1987	53,400	324,800	2,760	14.8
1988	60,100	368,993	2,900	16.7

* Sales by international manufacturers with U.S.-based sales offices are included in U.S. totals, but not international. The figures above are based on IDC's old definitions.

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MEDIUM-SCALE COMPUTER CENSUS

Medium-scale computer systems generally support 17 to 128 users in a normal commercial environment. Included are the IBM 4300 line, the mid-range systems from the Bunch, and the high end of lines from companies such as DEC, DG and Prime. System prices tend to fall in the $100,000 to $1 million range.

MEDIUM-SCALE COMPUTER CENSUS AS OF JANUARY 1, 1984
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NAME OF MANUFACTURER	COMPUTER MODEL	OLD SIZE CLASS	NEW SIZE CLASS	PURCHASE PRICE IN DOLLARS BASIC AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED
Auragen Systems Corp.	4000	SM	M	138	01/83	3	7	10
Basic Four Corporation	700	SB	M	130	08/77	109	99	208
	730	SB	M	124	06/78	530	600	1,130
	MAI 8000 Series (810)	SB	M	150	04/82	622	742	1,364
					TOTAL	1,261	1,441	2,702
BTI	8000	SM	M	175	05/81	41	10	51
Burroughs	2925	A4	M	362	03/83	180	120	300
	4955	A5	M	1,770	08/83	80	25	105
	2500	A4	M	521	02/67	1	3	4
	3500	A4	M	951	05/67	75	50	125
	45/4700	A5	M	1,630	10/71	115	55	170
	55/5700	A5	M	1,756	03/63	0	5	5
	2700	A4	M	554	08/72	30	25	55
	2800	A4	M	462	12/76	160	100	260
	3700	A4	M	1,285	11/72	120	130	250
	3800	A4	M	691	—/77	170	40	210
	4800	A5	M	1,412	09/76	315	110	425
	2900	A4	M	523	07/80	375	220	595
	3955	A4	M	763	09/81	175	40	215
	5930	A5	M	567	01/81	125	155	280
	5920	A5	M	439	—/82	75	40	115
					TOTAL	1,996	1,118	3,114
Cambex	1641	A4	M	175	10/80	7	15	22
	1641-11	A4	M	178	—/83	2	4	6
	1651	A5	M	209	—/82	5	4	9
	1651-11	A5	M	256	—/83	2	0	2
	1636-1	A4	M	100	10/81	7	0	7
	1636-10	A4	M	98	01/83	3	0	3
					TOTAL	26	23	49
Control Data Corp.	Cyber 71	A4	M	977	07/76	0	3	3
	Cyber 171	A4	M	1,161	08/77	4	36	40
	Cyber 72	A5	M	1,891	10/71	4	17	21
	Cyber 170-720	A5	M	1,594	05/79	60	100	160
	Cyber 170-825	A4	M	930	03/82	45	45	90
	Cyber 170-835	A5	M	1,902	03/82	25	25	50
	Cyber 170-815	A4	M	390	01/83	15	30	45
	Cyber 170-845	A5	M	1,600	12/83	25	25	50
	G-20	A4	M	867	04/61	1	0	1
	31/3150	A4	M	438	12/64	15	7	22
	3170	A5	M	1,014	12/70	6	3	9
	3200	A4	M	653	05/64	10	8	18
	3300	A5	M	1,558	09/65	66	21	87
	3400	A5	M	1,065	11/64	2	0	2
	3500	A5	M	1,401	01/69	23	10	33
	Omega 480-1	A4	M	376	06/77	30	0	30
	Omega 480-2	A5	M	384	08/78	50	3	53
	Omega 480-3	A5	M	439	01/80	35	2	37
					TOTAL	416	335	751
Data General	Eclipse S/250	SM	M	150	11/78	635	345	980
	Eclipse C/300, 330	SM	M	150	02/75	800	200	1,000
	Eclipse C/350	SM	M	180	11/78	600	200	800
	Eclipse M/600	SM	M	215	05/78	285	95	380
	Eclipse MV/6000	SM	M	200	02/82	365	155	520
	Eclipse MV/8000	SM	M	300	10/80	600	320	920
	Eclipse MV/10000	SM	M	510	—/83	140	60	200
					TOTAL	3,425	1,375	4,800
Digital Equipment Corp.	PDP-6	A4	M	400	10/64	0	0	0
	VAX-11/750	SM	M	90	—/80	4,700	3,540	8,240
	VAX-11/780	SM	M	210	05/78	5,300	3,550	8,850
	VAX-11/782	SM	M	440	—/82	160	100	260
	PDP-15 XVM	TM	M	82	02/70	550	320	870
	VAX 11/785	SM	M	280	—/84	0	0	0
	1040/50	A4	M	724	10/67	39	17	56
	1060/70	A5	M	899	06/72	65	34	99
	2040/50	A4	M	741	06/76	80	30	110
	2060	A5	M	1,014	07/79	250	130	380
					TOTAL	11,144	7,721	18,865
Digital Scientific Corp.	Meta 4/5030	SM	M	150	06/79	15	1	16
Formation	F/4000	SM	M	134	08/81	50	25	75

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MEDIUM-SCALE COMPUTER CENSUS AS OF JANUARY 1, 1984 (Continued)
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NAME OF MANUFACTURER	COMPUTER MODEL	OLD SIZE CLASS	NEW SIZE CLASS	PURCHASE PRICE IN DOLLARS BASIC AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED
Four Phase Systems	Two PI V/32	SM	M	125	06/78	100	6	106
	System 311	SM	M	265	02/81	155	15	170
	System 312	SM	M	320	12/81	52	8	60
	IV/40-IV/95	P	M	130	--/70	9,500	400	9,900
					TOTAL	9,807	429	10,236
Gould Computer Systems	32/75, 77	SM	M	150	03/78	1,100	269	1,369
	32/87	SM	M	500	11/81	252	55	307
	32/97	SM	M	500	--/84	0	0	0
					TOTAL	1,352	324	1,676
Harris	Slash 7	SM	M	180	10/75	18	1	19
	Series 100	SM	M	190	10/75	37	1	38
	Series 200	SM	M	240	10/75	52	3	55
	Series 1X5	SM	M	175	09/77	117	19	136
	Series 5X0	SM	M	300	12/78	89	9	98
	H80	SM	M	100	02/81	84	28	112
	H100	SM	M	150	01/71	755	33	788
	H300	SM	M	200	09/81	85	17	102
	H500	SM	M	250	01/79	375	81	456
	H800 Series	SM	M	275	03/80	455	55	510
	H700	SM	M	175	03/83	71	14	85
	Mind	P	M	140	08/82	180	85	265
	H600	SM	M	80	08/83	105	24	129
	H60	SM	M	70	05/84	0	0	0
	H1000	SM	M	292	03/84	0	0	0
					TOTAL	2,423	370	2,793
Hewlett-Packard	3000 I, II	SM	M	200	11/72	1,420	880	2,300
	3000 III	SM	M	200	06/78	2,309	989	3,298
	3000-64	SM	M	325	01/82	685	456	1,141
	3000-68	SM	M	375	12/83	60	0	60
	3000-48	SM	M	206	12/83	200	40	240
	1000-A/600	TM	M	20	02/82	4,420	2,940	7,360
	1000-A/700	TM	M	30	02/82	1,104	736	1,840
	1000-A/900	TM	M	50	02/82	1,380	920	2,300
					TOTAL	11,578	6,961	18,539
HIS	(GE) 3010/3012	TM	M	90	05/70	25	1	26
	116/316/416/516	TM	M	62	10/66	2,405	1,295	3,700
	700 Series	TM	M	65	06/72	2,114	1,811	3,925
	6/43,47,53,57,48, 54,74,76	SM	M	174	01/77	6,850	5,471	12,321
	6/92,96	SM	M	541	10/81	225	341	566
	Gamma-30	A4	M	437	02/62	0	0	0
	H-Level 64	A4	M	594	10/74	210	961	1,171
	DPS 7	A4	M	502	--/81	90	487	577
	DPS 8/20	A4	M	552	04/80	55	19	74
	DPS 8/44	A4	M	864	01/80	65	47	112
	DPS 8/47	A4	M	500	03/83	50	25	75
	DPS 8/49	A4	M	800	03/83	20	15	35
	DPS 8/52	A5	M	1,996	11/80	63	59	122
	DPS 8/62	A5	M	2,354	12/81	18	6	24
	DPS 8/44 Dual	A5	M	1,200	--/83	10	3	13
	G-200	A4	M	444	04/61	25	8	33
	G-400	A4	M	732	05/64	45	45	90
	G-6023/25	A5	M	1,557	11/73	7	9	16
	G-6030/40	A5	M	1,986	06/71	12	61	73
	H-125	A4	M	381	12/67	3	17	20
	H-1015/2015	A4	M	841	02/71	8	6	14
	H-1200	A4	M	657	02/66	60	19	79
	H-2040	A4	M	622	04/72	35	26	61
	H-2050/60	A4	M	961	04/72	65	42	107
	H-2200	A4	M	901	01/66	25	6	31
	H-2070	A5	M	1,672	05/72	10	0	10
	H-3200	A5	M	1,275	02/70	30	15	45
	H-4200	A5	M	2,006	09/68	3	1	4
	H-8/1800	A5	M	1,568	12/60	2	0	2
	H-4/1400	A4	M	585	12/61	4	3	7
	Comshare/Xerox	A5	M	612	06/79	15	0	15
	H-64/300	A4	M	404	04/79	105	948	1,053
	H-66/05/07	A4	M	902	10/76	38	86	124
	H-66/10/17	A5	M	1,474	06/75	24	65	89
	H-66/20/27	A5	M	1,986	11/74	64	126	190
	H-66/440/520	A5	M	913	12/79	80	39	119
	6/75	SM	M	155	09/83	10	5	15
	6/95	SM	M	220	09/83	10	7	17
					TOTAL	12,880	12,075	24,955

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NAME OF MANUFACTURER	COMPUTER MODEL	OLD SIZE CLASS	NEW SIZE CLASS	PURCHASE PRICE IN DOLLARS BASIC AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED
IBM	7040/44	A5	M	1,504	06/63	0	1	1
	7070/74	A5	M	1,357	03/68	0	0	0
	4381-2, 1	A5	M	1,000	1Q/84	0	0	0
	4361-4, -5	A4	M	475	2Q/84	0	0	0
	360/30	A4	M	552	06/65	290	105	395
	360/40	A4	M	935	06/65	320	110	430
	360/44	A4	M	920	07/66	17	9	26
	360/50	A5	M	1,620	08/65	130	45	175
	370/125	A4	M	648	06/78	150	400	550
	370/135	A4	M	1,003	05/72	270	275	545
	370/138	A4	M	977	11/76	570	940	1,510
	370/145	A5	M	1,871	07/71	230	220	450
	370/148	A5	M	1,667	03/77	635	615	1,250
	System 38-7	A4	M	397	06/82	900	900	1,800
	System 38-8	A5	M	400	07/83	150	140	290
	4331-2/11	A4	M	387	03/82	1,780	1,440	3,220
	4341-1/9/10	A4	M	814	10/79	5,260	5,150	10,410
	4341-2/11/12	A5	M	950	03/81	3,210	1,850	5,060
	1410	A4	M	836	11/61	4	1	5
	1460	A4	M	481	10/63	5	1	6
	7010	A5	M	1,254	10/63	0	0	0
					TOTAL	13,921	12,202	26,123
IPL	4436	A4	M	172	11/80	17	0	17
	4443	A4	M	218	03/80	40	0	40
	4445	A4	M	2,339	12/82	4	0	4
	4446	A4	M	307	12/81	66	12	78
	4460	A5	M	392	--/83	4	2	6
	4480	A5	M	605	--/83	0	0	0
					TOTAL	131	14	145
Magnuson	M80/3	A4	M	204	01/79	15	1	16
	M80/4	A5	M	324	12/78	28	4	32
	M80/30	A4	M	93	08/81	23	0	23
	M80/30E	A4	M	117	12/81	1	0	1
	M80/31	A4	M	140	06/80	74	7	81
	M80/32	A4	M	184	06/80	145	18	163
	M80/41	A4	M	170	02/82	0	0	0
	M80/42	A4	M	191	03/81	73	9	82
	M80/43	A5	M	249	03/81	61	6	67
					TOTAL	420	45	465
MDS Qantel	64 Series	SB	M	225	04/83	110	25	135
Modular Computer Systems	Modcomp IV	SM	M	100	05/74	339	130	469
	Classic 7870	SM	M	159	08/78	410	155	565
	Classic II/75	SM	M	153	05/82	170	90	260
	Classic II/85	SM	M	300	--/84	0	0	0
					TOTAL	919	375	1,294
NAS	AS/6100	A5	M	465	10/82	3	5	8
	AS/4	A5	M	918	06/77	19	8	27
	AS/3	A4	M	611	11/78	25	31	56
	AS/3000	A4	M	325	01/80	39	0	39
	AS/5000	A5	M	596	02/80	83	55	138
	AS/6620	A5	M	366	--/83	19	9	28
	AS/6630	A5	M	486	--/83	8	33	41
	AS/6650	A5	M	606	--/83	23	18	41
	7020/30	A5	M	820	01/79	0	7	7
					TOTAL	219	166	385
NCR	9300	SB	M	59	--/83	400	200	600
	315 RMC	A4	M	500	09/65	0	0	0
	8635	A4	M	900	--/83	3	7	10
	8645	A5	M	1,420	--/83	0	2	2
	8655	A5	M	1,775	--/83	0	1	1
	8560	A4	M	730	11/77	35	23	58
	8565	A4	M	574	04/79	90	145	235
	8565 II	A4	M	460	04/82	44	54	98
	8570	A4	M	934	05/76	83	76	159
	8575	A4	M	715	04/79	97	70	167
	8580	A5	M	1,700	12/78	4	8	12
	8585	A5	M	1,443	08/79	30	50	80
	8575 II	A5	M	537	05/82	35	38	73
	8585 II	A5	M	574	05/82	19	19	38
	8595 II	A5	M	727	05/82	16	17	33
	Century 200	A4	M	384	09/69	35	35	70
	Century 201	A4	M	617	09/69	55	60	115
	Century 251	A4	M	1,050	11/73	10	15	25
	Century 300	A5	M	1,400	02/72	34	40	74
					TOTAL	990	860	1,850

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MEDIUM-SCALE COMPUTER CENSUS AS OF JANUARY 1, 1984 (Cont.)
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NAME OF MANUFACTURER	COMPUTER MODEL	OLD SIZE CLASS	NEW SIZE CLASS	PURCHASE PRICE IN DOLLARS BASIC AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED
Perkin-Elmer	70	TM	M	65	12/71	1,108	348	1,456
	Cadam	SM	M	220	05/78	75	5	80
	8/32	SM	M	160	06/75	869	284	1,153
	3240	SM	M	192	10/79	318	89	407
	3250/XR	SM	M	190	02/82	126	123	249
	3200MPS	SM	M	300	--/83	25	9	34
					TOTAL	2,521	858	3,379
Prime	500	SM	M	330	06/76	80	40	120
	150 II	SM	M	65	06/80	20	60	80
	550	SM	M	105	02/79	1,025	625	1,650
	550 II	SM	M	110	07/81	525	245	770
	650	SM	M	165	02/79	90	55	145
	750	SM	M	220	07/79	1,120	400	1,520
	850	SM	M	370	07/81	205	80	285
	9950	SM	M	393	08/83	200	115	315
					TOTAL	3,265	1,620	4,885
Sperry Univac	491/492	A5	M	1,700	12/61	0	1	1
	1100/10	A5	M	2,053	04/76	55	131	186
	1100/20	A5	M	2,794	04/75	2	15	17
	1100/60	A5	M	1,903	03/80	520	1,017	1,537
	9400/80	A4	M	554	05/69	111	223	334
	90/40	A4	M	750	06/78	110	151	261
	90/60	A4	M	1,161	01/74	115	128	243
	90/80	A5	M	3,190	12/76	89	53	142
	90/70/9700	A5	M	1,332	08/72	5	18	23
	III	A4	M	1,175	08/62	45	8	53
	301	A4	M	308	10/60	3	0	3
	501	A5	M	726	06/59	0	0	0
	418 I, II	A4	M	470	06/63	28	27	55
	3301	A5	M	1,067	06/64	9	0	9
	418 III	A4	M	1,777	06/69	44	90	134
	Spectra 70/35	A4	M	663	01/67	11	2	13
	Spectra 70/45	A5	M	1,234	11/65	39	0	39
	Spectra 70/46	A5	M	2,051	11/68	0	0	0
	Spectra 70/55	A5	M	1,881	11/68	0	0	0
	Spectra 70/2	A4	M	648	07/71	1	0	1
	Spectra 70/3	A4	M	1,087	10/71	1	0	1
					TOTAL	1,188	1,864	3,052
Stratus Computer	Stratus/32	SM	M	200	02/82	102	40	142
Synapse	N+1	SM	M	340	12/82	5	0	5
Systems Engineering	32/55, 57	SM	M	125	08/75	570	175	745
Tandem	Non Stop, Nonstop II, TXP	SM	M	170	05/76	4,725	1,670	6,395
Wang	VS-100	SB	M	265	01/81	806	630	1,436
	VS-90	SB	M	163	01/82	540	250	790
					TOTAL	1,346	880	2,226
Xerox	Sigma 5	A4	M	585	08/67	63	6	69
	Sigma 6	A4	M	1,030	11/70	12	6	18
	Sigma 7	A5	M	1,223	12/66	25	4	29
	Sigma 8	A4	M	920	09/71	0	0	0
	940	A5	M	1,097	04/66	33	0	33
	550/560	A4	M	631	11/74	17	1	18
					TOTAL	150	17	167
					GRAND TOTAL	87,300	53,000	140,300

Notes: SM = Supermini; SBC = Small Business Computer; TM = Traditional Mini; A5 = General Purpose Size Class 5; A4 = General Purpose Size Class 4.

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SMALL-SCALE COMPUTER CENSUS

Census of top ten small-scale computer vendors, by dollar value of 1983 worldwide shipments. Small-scale computer systems generally range from 2-16 users in typical commercial applications. Representative systems include the IBM S/36, DEC PDP-11 and Vax 730, and systems such as those from Altos. Average systems prices are normally in the $10,000 to $100,000 range.

SMALL-SCALE COMPUTER CENSUS AS OF JANUARY 1, 1984
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Name of Manufacturer	Computer Model	Old Size Class	New Size Class	Average Purchase Price ($K)	Date of 1st Install.	Number Install. in U.S.	Number Install. Outside U.S.	Total Number Installed
IBM	Series 1	TM	S	30	11/76	37,700	14,600	52,300
	System/32	SB	S	42	03/75	4,400	4,250	8,650
	System/34	SB	S	64	12/77	38,000	35,500	73,500
	System/36	SB	S	56	10/83	3,000	1,000	4,000
	8100	p	S	140	08/79	5,980	4,600	10,580
	System 3-4	A2	S	61	06/76	50	25	75
	System 3-6	A2	S	78	12/70	215	55	270
	System 3-8	A2	S	105	06/75	470	625	1,095
	System 3-10	A2	S	120	01/70	1,985	660	2,645
	System 3-12	A3	S	181	03/76	850	860	1,710
	System 3-15	A3	S	334	03/74	2,050	1,030	3,080
	360/20	A3	S	142	12/65	280	115	395
	360/22	A3	S	182	07/71	5	6	11
	360/25	A3	S	409	10/68	17	70	87
	370/115	A3	S	470	04/74	120	530	650
	System 38-3	A2	S	146	07/80	860	770	1,630
	System 38-4	A3	S	157	08/81	1,600	1,430	3,030
	System 38-5	A3	S	293	07/80	4,500	3,410	7,910
	4321, 4331-1	A3	S	225	03/82	4,860	3,450	8,310
	1130	A2	S	125	02/66	460	245	705
	1401	A3	S	186	09/60	210	27	237
	1401 G-H	A2	S	111	05/64	1	0	1
	1440	A3	S	237	04/63	8	3	11
	1620	A3	S	135	09/60	20	11	31
					TOTAL	107,641	73,272	180,913
Digital Equipment Corp.	PDP-8/a, e, f, m	TM	S	15	04/71	45,120	22,930	68,050
	PDP-8/i, l, s	TM	S	27	05/65	5,765	3,685	9,450
	PDP-9, 9L	TM	S	50	12/66	290	160	450
	PDP/LSI-11/03, PDP/LSI-11/23	MM	S	5	06/75	62,300	38,750	101,050
	PDP-11/04, 05,10, 15, 20	TM	S	17	03/70	32,380	18,120	50,500
	PDP-11/24	TM	S	37	10/81	5,700	5,090	10,790
	PDP-11/34, 35, 40	TM	S	40	01/73	35,505	26,350	61,855
	PDP-11/44	TM	S	60	--/80	13,450	8,045	21,495
	PDP-11/45, 50, 55	SM	S	91	04/72	4,550	1,460	6,010
	PDP-11/60	SM	S	75	06/77	1,185	1,085	2,270
	PDP-11/70	SM	S	175	07/75	8,520	3,750	12,270
	VAX-11/730	SM	S	42	06/82	1,400	1,050	2,450
	PDP-12	TM	S	46	04/69	510	225	735
	VAX-11/725	SM	S	30	10/83	200	100	300
	2020	A3	S	326	07/78	220	185	405
					TOTAL	217,095	130,985	348,080
Hewlett-Packard	250	SB	S	28	09/78	2,219	4,259	6,478
	300	SB	S	58	09/78	220	310	530
	2100A	TM	S	15	06/71	7,900	3,400	11,300
	2100S	TM	S	36	08/73	1,825	1,425	3,250
	2114/15/16	TM	S	29	11/66	2,495	1,145	3,640
	1000-M (MX-M, K)	TM	S	25	06/74	8,446	6,597	15,043
	1000-E (MX-E)	TM	S	40	01/77	13,763	13,737	27,500
	1000-F	TM	S	55	09/78	5,661	4,026	9,687
	1000-L, XL	TM	S	10	06/79	1,590	1,360	2,950
	3000-33	SM	S	122	01/79	728	312	1,040
	3000-30	SM	S	80	10/79	1,067	458	1,525
	3000-40	SM	S	100	11/81	1,416	944	2,360
	3000-44	SM	S	170	03/81	2,760	750	3,510
	9020, 9030, 9040	SM	S	35	01/83	2,000	1,200	3,200
	3000-42	SM	S	120	12/83	43	28	71
					TOTAL	52,133	39,951	92,084
Burroughs	B80, B90	SB	S	29	11/76	10,240	15,760	26,000
	890	SB	S	33	12/79	0	0	0
	B700	SB	S	68	03/73	1,800	1,500	3,300
	B800	SB	S	51	05/77	5,712	3,208	8,920
	B900	SB	S	76	08/80	2,195	1,105	3,300
	1710	A2	S	145	12/75	190	235	425
	1720	A3	S	366	02/73	120	120	240
	2/3/500	A3	S	329	11/61	65	30	95
	1815/25/30	A2	S	127	05/77	200	360	560
	1855/60/70/85	A3	S	265	05/77	710	225	935
	1905	A2	S	103	04/80	245	140	385
	1955/1985	A3	S	204	04/80	2,105	1,615	3,720
					TOTAL	23,582	24,298	47,880
Wang	2200	SB	S	19	04/73	12,040	9,460	21,500
	2200 SVP, LVP	SB	S	20	09/80	7,380	5,795	13,175
	2200 VP, MVP	SB	S	31	09/76	10,713	8,412	19,125
	VS-80	SB	S	104	07/77	2,434	1,925	4,359
	VS-45	SB	S	85	10/82	800	730	1,530
	VS-25	SB	S	45	12/82	425	365	790
					TOTAL	33,792	26,687	60,479

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SMALL-SCALE COMPUTER CENSUS AS OF JANUARY 1, 1984 (Cont.)
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Name of Manufacturer	Computer Model	Old Size Class	New Size Class	Average Purchase Price ($K)	Date of 1st Install.	Number Install. in U.S.	Number Install. Outside U.S.	Total Number Installed
NCR	Tower 1632	TM	S	28	--/83	840	268	1,108
	8130, 40, 50	SB	S	23	02/77	937	3,600	4,537
	9010	SB	S	18	04/81	180	1,900	2,080
	9020	SB	S	28	03/81	2,330	4,650	6,980
	8200,30/31,50/51	SB	S	55	09/74	5,950	6,900	12,850
	8270	A2	S	91	11/79	435	660	1,095
	8350	A2	S	161	07/77	32	3	35
	8370	A3	S	281	07/78	4	0	4
	8410	A2	S	157	02/79	135	220	355
	8430	A3	S	259	06/78	75	240	315
	8450	A3	S	378	11/77	115	120	235
	8455	A3	S	270	04/79	187	340	527
	8555	A3	S	434	04/79	240	230	470
	8545 II	A3	S	329	04/82	24	45	69
	8550	A3	S	621	04/76	150	105	255
	8555 II	A3	S	418	04/82	150	175	325
	8535 II	A3	S	230	04/82	30	48	78
	9040	A2	S	120	05/81	375	1,330	1,705
	9050	A2	S	150	05/81	151	255	406
	Century 50	A2	S	84	02/71	50	55	105
	Century 75	A2	S	119	07/76	15	20	35
	Century 100	A3	S	164	09/68	55	45	100
	Century 101	A3	S	210	10/72	180	230	410
	Century 151	A3	S	302	02/75	70	85	155
	315/315/100	A3	S	0	05/62	0	1	1
					TOTAL	12,710	21,525	34,235
Texas Instruments	960-A/B	TM	S	30	12/71	4,000	1,900	5,900
	980-A/B	SM	S	40	10/72	4,050	1,800	5,850
	990/4	MM	S	8	06/76	8,255	2,960	11,215
	990/10	TM	S	23	03/76	21,315	9,695	31,010
	990/5	MM	S	10	03/79	7,485	3,140	10,625
	990/12	SM	S	52	11/79	4,180	2,875	7,055
	200	MM	S	9	08/82	275	200	475
	300	TM	S	14	01/83	2,700	1,500	4,200
	600	SM	S	40	08/82	2,400	1,225	3,625
	800	SM	S	54	01/83	500	270	770
					TOTAL	55,160	25,565	80,725
Data General	MP 100, 200, MPT 100	MM	S	3	05/79	1,000	300	1,300
	Micronova	MM	S	4	11/79	3,200	1,300	4,500
	Nova	TM	S	12	02/69	800	400	1,200
	Nova 2 Series	TM	S	10	10/73	7,280	2,720	10,000
	Nova 3/4	TM	S	10	01/76	3,395	2,005	5,400
	Nova 3/12	TM	S	18	01/76	16,470	5,180	21,650
	Nova 3/D	TM	S	36	10/76	2,340	2,140	4,480
	Nova 4/C, S, X	TM	S	20	03/79	13,600	8,900	22,500
	Nova 800/820	TM	S	40	03/71	1,620	580	2,200
	Nova 830/840	SM	S	44	07/73	520	280	800
	Nova 1200 Series	TM	S	11	12/70	10,870	4,130	15,000
	Supernova SC	TM	S	27	04/70	140	60	200
	Eclipse S100, 130, 140, AP/130	SM	S	30	02/75	5,950	3,005	8,955
	Eclipse S200, 230	SM	S	55	02/75	4,240	1,480	5,720
	Eclipse C/150	SM	S	120	12/78	500	300	800
	Eclipse MV/4000	SM	S	70	12/82	400	200	600
	DCC-112	TM	S	12	08/70	900	500	1,400
	DCC-116	TM	S	10	11/71	9,600	1,700	11,300
	DCC-416/616	TM	S	7	09/75	180	20	200
	DCC-Model 5	TM	S	6	02/76	90	10	100
	Desktop Generation 20, 30	DT	S	8	10/83	420	80	500
	S120	TM	S	20	--/82	630	400	1,030
	Eclipse 280	SM	S	90	--/83	300	200	500
	S 20	TM	S	12	--/82	1,000	500	1,500
					TOTAL	85,445	36,390	121,835
Datapoint	8800	P	S	40	03/80	3,386	1,000	4,386
	8600, 8625, 8635	P	S	17	04/81	6,211	2,000	8,211
	6600	P	S	10	--/72	7,500	2,500	10,000
					TOTAL	17,097	5,500	22,597
Prime	100	TM	S	12	04/73	310	560	870
	200	TM	S	22	11/72	430	210	640
	300	SM	S	58	09/73	460	350	810
	400	SM	S	207	06/76	220	180	400
	250 II	SM	S	75	06/80	310	730	1,040
	350	SM	S	116	07/78	200	120	320
	450	SM	S	75	02/79	300	120	420
	2250	SM	S	50	10/82	2,300	1,100	3,400
					TOTAL	4,530	3,370	7,900

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• DATAPOINT FUTURE DEBATED. After lopping off one plant and 240 employees in Fort Worth, Datapoint still faces an uncertain future; rumors are rife concerning a takeover bid. Asher B. Edelman, the New York investor, has confirmed that he and surrogates have purchased 8% of Datapoint stock with a view towards sale, a leveraged buyout, merger, or liquidation. The most noteworthy example of Edelman's recent interest in computer-related companies has been the dismemberment of Mohawk Data Sciences Corp.

• LEADING EDGE/MITSUBISHI MARRIAGE ON ROCKS. The $1.05 billion suit brought by Leading Edge against its personal computer supplier is another aftershock from IBM's price slashing. Leading Edge wanted Mitsubishi to cut its price to them to correspond to the new retail price tags they initiated to compete with IBM. Mitsubishi balked. Leading Edge held up checks. Mitsubishi held up PCs. Both are in court. Leading Edge deposes that Mitsubishi's intent is to void the contract and market PCs under its own name; Sperry, whose PC is built by Mitsubishi to its specifications, sees no imminent threat.

• SEMICONDUCTOR SQUEEZE CLAIMS VICTIMS. First Honeywell responded to the increasingly weak semiconductor market by announcing plans to sell Synertek Inc., its semiconductor subsidiary, and laying off most of its 1700 employees. Then Texas Instruments asked over 2,000 workers to punch out from semiconductor production. Intel meanwhile is sticking to its knitting; witness the decision to sell its System 2000 Data Base Management System to SAS Institute Inc.

• TRILOGY TRIES TO REPOSITION ITSELF. Chairman Gene Amdahl has relinquished CEO responsibilities in favor of Henry C. Montgomery, the company's president, as Trilogy seeks to redefine itself amid the wreckage of its abortive supercomputer/superchip projects. The company announced plans to acquire California Devices, Inc., a semiconductor manufacturer, as "part of Trilogy's new strategic plan to focus on extending the company's strong technology base through the addition of outside product and marketing capabilities and the enhanced utilization of Trilogy's facilities."

• EXXON SEEKS BUYER FOR OFFICE SYSTEMS. Oil and computers don't necessarily mix, at least when major financial commitments are necessary and oil revenues remain squishy soft.

• NBI INC. ENGORGES COMMERCIAL OFFICE PRODUCTS CO. AND ISI. Viewing itself as a potential office automation giant, NBI has acquired within a week both Commercial Office Products, a distributor of office supplies and furniture, and Integrated Solutions Inc., a manufacturer of Unix-based computer systems.

• DECTALK SPEAKS ON ELECTRONIC MAIL. Digital's All-In-One office system took an important step toward becoming all-in-one in actuality with the introduction of Dectalk Mail Access, which allows Dectalk's synthesized voice to read aloud (e.g., over a phone) messages written into the system.

• PERIPHERAL VISION BLURS AT BOTTOM LINE. Add to the roster of computer equipment producers inscribed in red ink the names of Applied Data Communications (3rd quarter) and General Automation Inc. (1st quarter, down over $1.225 million). On a cheerier note, Data Access Systems has come out of Chapter 11 proceedings with net income of over $3.6 million, its first profits since 1978.

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REVIEW & FORECAST
Part I

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

DAVID MOSCHELLA, EDITOR JULY 8, 1983 ● V/19, NO. 6 P.J. MCGOVERN, PUBLISHER

U.S. PERSONAL COMPUTER MARKET WILL SURPASS MAINFRAMES BY 1984; DEMOGRAPHICS SEEN AS ONLY MARKET BOUNDARY

"Blitzkrieg -- (lightning war); a war conducted with great speed and force."

How else can the success of the personal computer be described? In 1981, the value of personal computer shipments to the U.S. passed those of terminals; in 1982, small business computers fell; 1983 will leave the mini behind; and by 1984, the once almighty general-purpose market will succumb. Demographic ceilings may now be the only limiting factor, and they are far from being reached.

But more than just creating instant millionaires and exciting new sub-industries, the rise of the personal computer (PC) almost guarantees the information industry's future success. By dramatically expanding the user base, PCs have exponentially increased the material and cerebral resources being focused on the use of information technology. The benefits will surely follow.

The numbers tell the story. International Data Corp., publisher of EDP/IR, estimates that 1982 worldwide shipments of personal computers by U.S. manufacturers reached $5.4 billion, up 77% over 1981. Over the 1983-1987 period, the value of shipments will increase at 38.2% per year, reaching a staggering $27.2 billion by 1987. Thanks to the home market, unit growth will be even higher.

Thus far at least, only standalone word processors and small business computers have been seriously hurt by PC success, but as software improves, terminals and small minis are also feeling the heat. Among the key issues:

- Falling prices. Nearly three million units will be shipped to the U.S. home market in 1983, thanks to price cuts of up to 75% since 1981. Business system prices have held more firmly.

- Open architecture. The success of IBM's MS/DOS-based PC and its open architecture is moving the industry away from the proprietary operating systems of Apple, Tandy and Atari. The standards are also a key to the diverse peripheral options now coming to the market.

- Distribution. Like it or not, shelf space and retailer enthusiasm may be the single most important sales factor. There are over 150 PC vendors and the average retailer carries about five.

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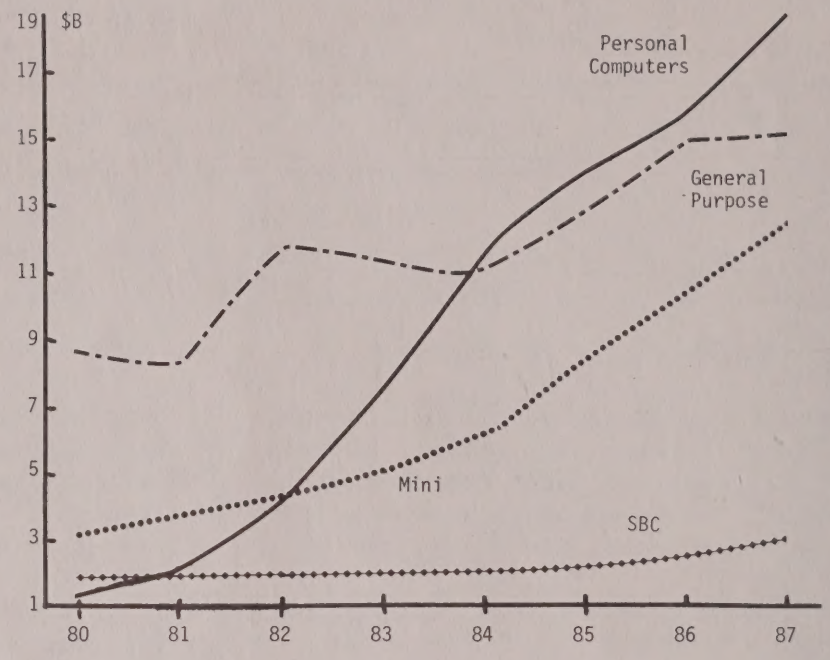
PERSONAL COMPUTERS RISE TO THE TOP; VALUE OF U.S SHIPMENTS, 1978-1987
(Copyright 1983 -- International Data Corporation)

From a manufacturer's standpoint, there is one main caveat to the chart opposite. All the figures used are based on the average retail price of the systems sold. In the case of personal computers, a substantial percentage of the retail price is absorbed by the distribution process, whereas for mainframes, almost all of the revenue accrues to the system builders. Thus, one could still argue that from the manufacturer's point of view, mainframes are still the number one revenue provider.



Market definitions and segmentations

As microprocessor technology becomes the key to systems ranging from $50 to $50,000 dollars, it has become increasingly difficult to view the personal computer market as a nice, neat package. IDC's PC category includes only those machines that are primarily sold as single-user systems. Until this year, IDC used the phrase "desktop computer," but since CPUs that sit on a desk often support multiple users, IDC has now switched to the term "personal computer."

This new definition has led to some slight revisions from the censuses of the past few years. The two most significant are that multi-user micros such as those from Altos and Fortune have been taken out, and single-station processing terminals, like those made by Datapoint and Zentec, have been included. Neither change is large enough to significantly alter the overall summary data.

IDC continues to segment the market into four separate categories -- home, educational, business/professional, and scientific. In terms of the value of U.S. shipments, five-year growth rates are: business/professional, 38.4%; home, 35.1%; scientific, 24.6%; and educational, 18.1%. The corresponding percentages for U.S. unit shipment growth are not significantly different.

Despite the high level of shipments, IDC does not believe that the business/professional market is approaching saturation. Government statistics show that by 1987, there will be some 60 million white collar workers in the U.S., and IDC is projecting a 1987 installed base of some 19 million PCs in the business/professional market. On the home front, IDC expects some 37 million machines to be installed in 1987. There are currently only 80 million U.S. households, suggesting a flattening of home market growth in the 1985-1987 period.

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APPLICATION SEGMENTATION, U.S. PERSONAL COMPUTER MARKET
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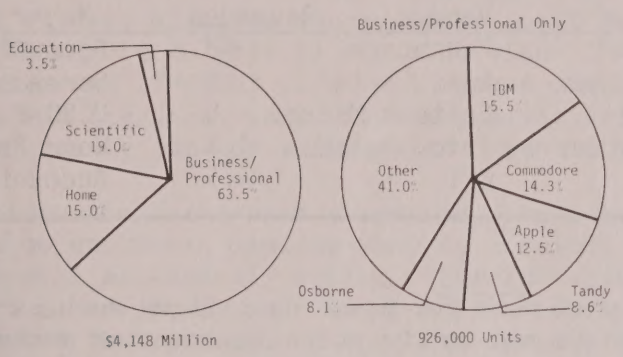

IBM jumped way up from just 6% of the market in 1981, and it should increase its lead in 1983 as production continues to ramp up. The business/professional market has been broken out separately because, although the business market is the leader in dollar value, in terms of unit shipments, the home market totally dominates with over 63% of 1982 U.S. shipments.

Because of sharp price/performance increases, the scientific market will remain strong, but vendors such as HP and Tektronix are running into competition from today's powerful 16-bit PCs. The educational market still looks relatively sluggish. There are not enough teachers who know how to use PCs, and interactive courseware is not yet available for most school subjects.

Although some sort of shakeout is inevitable, EDP/IR thinks that the demand for diverse hardware products will make it impossible for a small group of vendors to service the entire industry. Just as motor vehicles run the gamut from mopeds to 18-wheelers, there will be a spectrum of computing options across the $50 to $50,000 range. Given today's market flux, it is unlikely that any handful of vendors will be able to meet the entire market demand anytime soon.

Software patterns

Unlike the balkanized hardware world, personal computer software patterns are starting to take shape. Because of the emphasis on just a few microprocessors (the 68000 and 808X) and operating systems (CP/M, MS/DOS, and Unix), software transportability is becoming more common, and the use of proprietary operating systems for general-purpose PCs is fading. It has become a truism that software sells hardware. Among the key issues:

- User interfaces. Apple's Lisa and recent imitations such as Visicorp.'s VisiOn have emphasized visual aids. In addition, mice have been showing up on everything from executive workstations to CAD/CAM systems. Mouse vendors (featuring names such as Mouse House and Mouse Systems) are reporting very high PC vendor interest as they debate the fine points of digital, mechanical, and even optical mice. Some are already dubbing 1984 as "the year of the mouse."

- Bundling. Integrated applications packages such as on Lisa or Grid's system mark a return to bundled software pricing that could get contagious as multi-tasking options increase software complexity.

- Mini architecture. Honeywell and DEC are bringing mini architecture to the chip level. EDP/IR expects other mini vendors to follow.

- PC/mainframe links. PC access to corporate data has become a hot topic for PC vendors, software houses, service bureaus and MIS groups.

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1982 WORLDWIDE REVENUES TOP 10 INDEPENDENT PC SOFTWARE SUPPLIERS ($M)
(Copyright 1983 -- International Data Corp.)

Vendor	Revenues	Major area	Vendor	Revenues	Major area
VisiCorp	$35	Spreadsheet	Peachtree	$9	Accounting
Microsoft	32	Oper. Systems	Soft. Arts	6	Spreadsheet
MicroPro	26	Word Star	Softech Micro.	5	UCSD-P
Dig. Research	22	Oper. Systems	Info. Unltd.	4.5	Word Proc.
Ashton-Tate	14	DBMS	BPI	4.5	Accounting

Portables ... another rising star

Proving that there is still plenty of room for start-ups, firms such as Osborne, Kaypro, and Compaq have made it big in the portable computer market. Although there is clearly a demand for portable machines, EDP/IR thinks that one of the key reasons for the portable vendor's success thus far has been their low prices, often less than $2,000 for a usable system with software.

IDC breaks this market out into four sectors: handheld; true portables; plug-in portables; and transportables, with the distinctions generally coming down to dimensions, weight, and power supply (see EDP/IR, V/19, #3). Thus far, the action has been dominated by transportables, but true portables are rapidly emerging as evidenced by new products by Gavilan and Sharp. Expect many new products over the next 12 months from new and established vendors alike.

Portables are, of course, giving further impetus to the markets for small, low-cost storage, display and output technologies. Bubbles, cassettes, high-density ROMs, and sub-5.25" floppies are all being used, as is flat panel screen technology. Limited display size is still the market's biggest problem. The emphasis on miniaturization suggests a market for Japanese components.

Portables will also expand the application base. Transportables basically perform the same tasks as their PC brethren, but now a market for smaller specialized devices is rapidly emerging. Tandy's RS-100 is selling well as a word processing or data entry machine, as is a similar product from Epson. Handheld and book-size devices will meet many industry and application-specific needs.

RETAIL DOLLAR VALUE OF 1982 U.S. SHIPMENTS -- TOP 10 PC VENDORS
(Copyright 1983 -- International Data Corporation)

Vendor	1982 $ Millions	1981 $ Millions	%
IBM	836	199	320%
Apple	658	331	99
Commodore	464	96	383
Tandy	379	491	-23
Osborne	179	12	1392
Convergent Tech.	172	23	648
NEC	143	36	297
Hewlett-Packard	135	148	-9
Xerox	99	60	65
Atari	83	44	89
Other	1,000	655	53
Total	4,148	2,095	98

As the data shows, market shares and shipment levels can change dramatically within a single year. The big winners this year were IBM, Commodore, Apple, Osborne, Convergent Technologies and NEC. Among those that fell out of the top 10 in 1982 were Cromemco, Zenith, and Compucorp, while Tandy and HP suffered notable market share losses. Not all retail revenues accrue to the manufacturer.

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Technology trends and impact

Led by microprocessor and Winchester disk technology, the next few years will witness dramatic improvements in PC hardware capabilities. By 1985-86, $5,000 should be able to buy a PC with: 1-4 MIPs processing power, 1-16MB main memory; and 10-400MB of direct access storage. Additionally, support processors for graphics, text, floating point arithmetic and other specialized tasks will greatly enhance workstation capabilities.

Given the forecasted shipments, the increase in installed processing power will be enormous, causing many to conclude that the mini and/or mainframe business will necessarily suffer. EDP/IR believes that until the major vendors start to seriously push local area network technology and until today's mini software is available on PCs, the markets for PCs and minis will remain relatively discrete. As for mainframes, the use of PCs as terminals and manipulators of host data will increase the demand for central resources.

Functionally, there really isn't much difference between networked PCs sharing disk and printer resources, and a typical multi-user small system. It's mostly a matter of where the processing resources are located. The real issues are price/performance and response times. Right now, on a cost basis, a small VAX or Eclipse can compete with PC solutions while offering the advantage of being a proven system supported by a single vendor. But response times vary with application and usage patterns, and here PCs may well have an edge.

In short, EDP/IR believes that the demand for processing power will remain a continuous function over a broad price range. The price/performance of today's minis and small mainframes will increase almost as fast as that of PCs. Depending on application and type of user, the cost trade-offs will vary.

Distribution issues

After several years of squabbling over discount practices and levels of service and support, EDP/IR sees the channels of distribution starting to mature and stabilize. Apple, DEC, Commodore, and Data General are among those who've rethought their distribution strategies, and everyone has realized the importance of advertising and shelf space. IBM's biggest headache has been allocating PCs in a supply constrained environment. Some expected developments:

- OEM business will pick up in the 1984-85 period as PCs start to compete more with minis and as industry-specific markets open up.

- Retail stores will continue to carry a lot of clout with vendors, although vendors are learning to insist on quality retailers who are willing to offer reasonable service and support.

- Large users will buy direct from the vendor to get maximum discounts. Financing schemes have yet to emerge, but since today's PCs are the IBM 360s of their day, volume leasing may be attractive to large organizations, an interesting opportunity for third party lessors.

- Distributors will continue to be a key distribution channel, although their share of the market will decline. Manufacturers will increasingly sell direct to the retailer to cut out the middleman's margin. Distributors are the source of many pricing headaches.

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PERSONAL COMPUTER MARKET -- U.S.-Based Manufacturers[a]

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1977	51,000	215,000	296	2.0
1978	178,000	343,000	769	2.8
1979	289,000	682,000	1,072	3.8
1980	442,000	1,124,000	1,983	5.8
1981	853,000	1,977,000	3,043	8.8
1982	3,786,000	5,763,000	5,391	14.3
1983	6,535,000	12,928,000	9,766	24.1
1984	11,161,000	24,089,000	14,967	39.0
1985	14,871,000	39,070,000	18,934	58.0
1986	19,038,000	57,998,000	21,931	80.9
1987	23,528,000	81,526,000	27,167	108.1
		UNITED STATES		
1977	32,000	101,000	230	0.9
1978	131,000	232,000	455	1.4
1979	183,000	415,000	648	2.0
1980	308,000	723,000	1,213	3.2
1981	611,000	1,334,000	2,095	5.3
1982	3,130,000	4,464,000	4,148	9.5
1983	5,076,000	10,170,000	7,565	17.0
1984	9,818,000	18,988,000	11,606	28.6
1985	11,214,000	30,312,000	14,130	42.9
1986	13,535,000	43,737,000	15,548	59.3
1987	15,813,000	59,550,000	19,012	78.3
		INTERNATIONAL		
1977	19,000	114,000	166	1.1
1978	47,000	161,000	313	1.4
1979	106,000	267,000	422	1.8
1980	134,000	401,000	770	2.6
1981	242,000	643,000	948	3.5
1982	656,000	1,299,000	1,243	4.8
1983	1,459,000	2,758,000	2,201	7.1
1984	2,343,000	5,101,000	3,361	10.4
1985	3,657,000	8,758,000	4,804	15.2
1986	5,503,000	14,261,000	6,383	21.6
1987	7,715,000	21,976,000	8,155	29.8

[a] International Manufacturers with U.S.-based sales offices are counted in U.S. totals, but not international.

NOTES TO CENSUS AND FORECAST: The value of computer system shipments shown on the red pages represents the if-sold price of the equipment at the time of sale. The value of shipments and installed base includes peripheral sales based on IDC's average system values, as shown in the census section.

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*DESKTOP COMPUTER MARKET -- U.S. BASED MANUFACTURERS[a]

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1977	34,000	50,000	244	0.5
1978	62,000	212,000	562	1.1
1979	276,000	488,000	1,036	2.0
1980	455,000	943,000	1,809	3.7
1981	827,000	1,770,000	2,948	6.8
1982	3,275,000	5,045,000	5,230	11.9
1983	6,565,000	11,610,000	9,650	21.5
1984	10,489,000	22,099,000	14,943	36.5
1985	14,026,000	36,125,000	18,706	55.3
1986	17,881,000	54,006,000	22,273	77.5
1987	22,020,000	76,026,000	25,953	103.5
		UNITED STATES		
1977	25,000	33,000	168	0.3
1978	27,000	160,000	397	0.7
1979	183,000	343,000	668	1.3
1980	327,000	670,000	1,160	2.4
1981	591,000	1,261,000	2,029	4.5
1982	2,634,000	3,895,000	4,045	8.5
1983	5,096,000	8,991,000	7,349	15.8
1984	8,101,000	17,092,000	11,457	27.3
1985	10,423,000	27,515,000	14,060	41.4
1986	12,660,000	40,175,000	16,676	58.0
1987	14,907,000	55,082,000	19,423	77.5
		INTERNATIONAL		
1977	9,000	17,000	76	0.2
1978	35,000	52,000	165	0.4
1979	93,000	145,000	368	0.7
1980	128,000	273,000	649	1.3
1981	236,000	509,000	919	2.3
1982	641,000	1,150,000	1,185	3.4
1983	1,469,000	2,619,000	2,301	5.7
1984	2,388,000	5,007,000	3,486	9.2
1985	3,603,000	8,610,000	4,646	13.9
1986	5,221,000	13,831,000	5,597	19.5
1987	7,113,000	20,944,000	6,530	26.0

[a] International Manufacturers with U.S.-based sales offices are counted in the U.S. totals, but not international.

*NOTE: IDC has made some changes in its classification scheme. The old "desktop computer" category has been replaced by the "personal computer" label. The key difference is that "personal computers" include single-station processing terminals, like those made by Datapoint, and exclude multi-user micros, such as those made by Altos. The census that follows corresponds to the "personal computer" red page. The "desktop" red page is provided for historical comparison.

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PERSONAL COMPUTER CENSUS

A personal computer is a device that is oriented for individual use. This may be for single or multi-tasking environments, but the major emphasis is for a single user. Systems may range from under $50 to more than $20,000, but the primary price range is $50 to $10,000. These systems are microprocessor based, must be programmable in a high level language, and have the capability of attaching necessary peripheral devices. Systems are placed in this category on the basis of primary competition with established members such as Apple, IBM PC, Commodore VIC 20, Texas Instruments 99/4A, and Hewlett-Packard 9800 or their successors. Board level computers are excluded from this category.

PERSONAL COMPUTER CENSUS AS OF JANUARY 1, 1983

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE IN DOLLARS BASIC	PURCHASE PRICE IN DOLLARS AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	SHIPMENTS NEXT 12 MONTHS
Access Matrix	Access Computer	Z80-A		2,495	2,495	--/83	0	0	0	NA
All Computers, Inc. (U.S. Only)	All Computer Series	8088		995	995	--/83	0	-	0	NA
Alspa Computer	ACI-1	Z80-A		1,995	1,995	07/81	1,200	180	1,380	NA
	ACI-2	Z80-A		2,995	2,995	01/82	1,800	120	1,920	NA
	Bottom Line	Z80-A		4,500	4,500	01/83	0	0	0	500
						TOTAL	3,000	300	3,300	
A.M. Jacquard	J500	A.M. Jacquard		12,000	16,000	12/78	1,600	1,200	2,800	1,200
APF Electronics *	IMI	6800		400	1,115	11/79	14,000	0	14,000	X
Apple	Lisa	68000		10,000	10,000	--/83	0	0	0	NA
	Apple II, IIe	6502		1,330	2,500	05/77	447,900	122,100	570,000	NA
	Apple III	6502		4,240	6,000	11/80	31,100	8,900	40,000	NA
						TOTAL	479,000	131,000	610,000	
Applied Digital Data Sys.	Vantage	8080		11,000	14,000	07/76	550	400	950	X
Archives, Inc.	ABS 1	Z80		4,500	5,357	01/80				NA
	ABS 2	Z80		5,500	5,500	01/80	2,500	300	2,800	NA
	ABS 3	Z80		7,000	7,000	01/80				NA
Astrocom	Series 760	Z80		16,000	20,000	06/79	30	0	30	NA
Atari	400	6502		250	300	09/79	266,000	60,000	326,000	NA
	800	6502		550	650	09/79	116,000	24,000	140,000	NA
						TOTAL	382,000	84,000	466,000	
Athena Computer	Athena I	2NSC800		3,950	4,250	01/83	0	0	0	5,000
Basic Four	S10	Z80		5,995	5,995	06/82	2,500	0	2,500	10,000
Basis, Inc.	108	6502/Z80		3,085	3,085	06/82	25	0	25	NA
Billings Computer Co.	BC12FD	Z80		6,600	9,500	03/79	1,710	1,790	3,500	NA
	BC120F2M	Z80		9,900	12,900	03/79				NA
	BC 500	Z80		2,500	2,500	12/82	40	0	40	NA
	BC-104	8080-A		12,000	22,000	--/77	400	0	400	X
						TOTAL	2,150	1,790	3,940	
BRD, Inc. *	Small Fry	6800		7,000	10,000	04/79	50	0	50	X
	Porpoise	6800		10,000	13,000	01/78	160	5	165	X
						TOTAL	210	5	215	
Burroughs	B20	SEE CONVERGENT								
	TC 500/700	Burr		NA	NA	NA				
	TC 3000/5000	Burr		NA	NA	NA	19,250	26,500	54,758	NA
	BMT 600	Burr		NA	NA	NA				
Callan Data Systems, Inc.	Unistar 100	68000		9,950	9,950	08/82	300	0	300	1,500
Century Computer Corp.	Opus III	C-200		15,000	22,000	02/71	560	110	670	X
Canon (U.S. Only)	BX-3	6809		5,600	5,600	05/81	100	-	100	X
	CX-1	6809		4,995	7,000	05/81	500	-	500	X
						TOTAL	600	-	600	
CIE Systems	680/30	68000		10,000	16,000	11/82	4	0	4	NA
Clary Data Systems	404	Clary		6,000	30,000	01/70	100	32	132	X
Codata Systems Corp.	CTS-100	Z80-A		7,392	9,937	06/80	320	0	320	X
	CTW-300	68000		11,405	13,950	06/81	1,350	0	1,350	30
						TOTAL	1,670	0	1,670	
Codex	CDX 68/20, 40	6809		8,000	12,000	--/81	400	185	585	NA
	CDX 68/24, 44	6809		10,000	12,000	06/82				
Commodore	PET/CBM	6502		995	1,295	10/77	160,000	235,000	395,000	150,000
	VIC/20	6502A		150	150	06/81	750,000	250,000	1,000,000	1,000,000
	Super Pet	6502B		1,995	1,995	07/81	50,000	20,000	70,000	50,000
	64	6510		400	400	08/82	50,000	0	50,000	300,000
	128	6510		795	795	03/83	0	0	0	120,000
	B, BX700	6509		1,695	2,995	07/83	0	0	0	120,000
						TOTAL	1,010,000	505,000	1,515,000	1,740,000
Compal	8100	8080		12,000	12,000	12/76	400	10	410	X
	EZ Type	Z80		8,995	9,995	03/81	150	5	155	200
						TOTAL	550	15	565	
Compaq Computer Corp.	Compaq	8088		2,995	2,995	02/83	0	0	0	50,000

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Compucorp	625	Z80		5,000	8,500	06/77	200	500	700	X
	655	Z80		4,000	6,500	04/79	2,585	4,315	6,900	
	665	Z80		5,000	7,000	04/79	1,130	2,070	3,200	
	675	Z80		7,000	9,078	06/79	4,000	6,600	10,600	
	685	Z80		11,000	11,600	05/81	690	810	1,500	
	685E	Z80		13,600	13,600	05/82	390	210	600	
	686	Z80		15,995	15,995	05/82	195	105	300	10,000
	745	Z80		4,495	4,495	08/82	195	105	300	
	775	Z80		7,400	7,400	01/83	0	0	0	
	785	Z80		10,200	10,200	01/83	0	0	0	
	790	Z80		11,700	11,700	01/83	0	0	0	
	Simplifier	Z80		4,995	5,700	07/82	975	525	1,500	
						TOTAL	10,360	15,240	25,600	
CompuCorp *	402	CompuCorp		13,000	15,000	01/76	15	455	470	X
	450	CompuCorp		20,000	22,000	04/76	40	115	155	X
						TOTAL	55	570	625	
Computek	Display 8			3,000	6,000	--/81	900	0	900	700
Computer Data Systems *	Versatile 4	8085		3,800	4,500	11/77	700	150	850	X
	Versatile 3B	8085		4,900	5,500	11/77	250	50	300	X
						TOTAL	950	200	1,150	
Computer Devices	DOT	8088		2,995	3,995	04/83	0	0	0	7,000
Computer Hardware, Inc.	4800	CHI	a	8,850	10,500	04/81	10	0	10	5
Computer Interface Tech.	Pense System	Microengine		5,295	8,000	11/79	400	355	755	X
Convergent Technologies	AWS	8088		5,795	6,795	11/81	400	100	500	X
	IWS	8086		8,400	16,000	10/80	5,000	1,000	6,000	NA
	AWS Turbo	8086		4,790	6,900	01/82	17,000	3,000	20,000	NA
	AWS Color Turbo	8086		12,190	12,990	02/83	0	0	0	NA
						TOTAL	22,400	4,100	26,500	
Burroughs	B20	8088		10,000	14,000	06/82	1,800	1,800	3,600	NA
NCR	Worksaver	8086		7,000	8,500	04/82	900	100	1,000	NA
Computer Shop	Star Lite	Z80-A		2,695	2,695	--/83	0	0	0	4,800
Corona Data Systems	Corona PC	8088		2,595	2,995	01/83	0	0	0	NA
	Corona Portable PC	8088		2,395	2,795	04/83	0	0	0	20,000
Corvus Systems	Concept	68000		4,995	7,000	05/82	1,000	1,000	2,000	NA
Cromemco	System Zero/D	Z80-A		2,995	4,990	12/80				NA
	System Zero	Z80-A		995	2,990	12/80	23,500	11,500	35,000	NA
	System One	Z80-A		3,995	7,585	12/81				NA
	System Three	Z80-A		5,995	10,943	08/77				NA
	C-10	Z80-A		1,785	2,500	--/83	0	0	0	NA
						TOTAL	23,500	11,500	35,000	
Cyber Systems, Inc.	CYKEY 9910	Z80		7,000	9,000	06/81	15	0	15	X
	CYKEY 9980	Z80-A		6,999	6,999	01/82	15	0	15	15
	CYKEY 9990	Z80-A		7,282	7,282	01/82	5	0	5	25
						TOTAL	35	0	35	40
Datamac Computer Sys.	1200 Series	Z80		2,295	4,195	07/81	200	70	270	X
	800 Series	Z80		2,295	3,500	07/82	150	50	200	1,500
						TOTAL	350	120	470	
Data Technology, Inc.	Associate	Z80		3,450	3,450	06/79	1,500	1,500	3,000	9,000
	Associate +	Z80		3,850	3,850	03/80	350	250	600	4,000
	Associate	Z80		4,950	4,950	01/81	60	85	145	2,000
						TOTAL	1,910	1,835	3,745	15,000
Datapoint	1100	Datapoint		7,000	12,000	--/77	16,000	8,000	24,000	X
	2200	Datapoint				09/77				
	1500	Datapoint		6800	9100	--/73	7,500	2,500	10,000	X
	1560	Z-80A		3,195	6,500	11/82	990	10	1,000	
	1800	Datapoint		7,500	12,000	--/75	7,500	2,500	10,000	X
						TOTAL	15,990	5,010	21,000	
Dataview Corporation	200 Series	Z80		2,295	2,295	11/81	200	0	200	200
	300	Z80		5,995	5,995	11/81	200	0	200	200
						TOTAL	400	0	400	400
Digicomp Research	Delphi-100	Z80, 68000		14,000	17,000	07/82	12	0	12	50
Digilog Business Sys.	1000	Z80-A		2,995	2,995	11/80	1,800	400	2,200	1,000
	1016	Dual 8186,Z80		3,995	3,995	02/83	0	0	0	150
	1500	Z80-A		4,995	4,995	07/81	1,000	300	1,300	1,500
	1516	Dual 8186,Z80		5,995	5,995	02/83	0	0	0	150
	2000	Dual Z80-A		8,400	8,400	09/80	200	0	200	X
						TOTAL	3,000	700	3,700	2,800
Digilog, Inc.	7120	Dual Z80-A		8,400	8,400	03/79	0	1,500	1,500	X
	7130	Dual Z80-A		10,500	10,500	07/81	0	2,000	2,000	X
						TOTAL	0	3,500	3,500	
Digital Equipment Corp.	Mini MINC	LSI-11		9,900	11,000	10/79	5,350	820	6,170	1000
	Data Sys. 150	LSI-11		10,900	15,000	03/79	1,200	900	2,100	X
	VT100 (18XKit)	Z80		5,000	5,000	01/82	2,900	100	3,000	5,000
	Decmate II	6120		3,740	3,790	01/83	0	0	0	
	Rainbow 100	Z80, 8088		3,245	3,245	--/82	1,050	100	1,150	50,000
	325	F11		3,995	3,995	--/82	1,150	100	1,250	
	350	F11		4,995	4,995	--/82				
						TOTAL	11,650	2,020	13,670	56,000
Digital Microsystems	DSC-2	Z80-A		4,995	5,895	11/77	5,140	2,210	7,350	X
	DSC-2585	Z80-A		9,950	9,950	06/78	300	0	300	X
	DSC-3	Z80-A		5,495	15,000	11/80	1,015	1,435	2,450	1,500
	DSC-4	Z80-A		6,950	10,000	10/80	210	235	445	
	DMS-3F	Z80-A		3,995	3,995	04/82	50	50	100	200
	DMS-15	Z80-A		7,495	7,495	01/83	0	0	0	1,500
						TOTAL	6,715	3,930	10,645	3,200
Durango Systems	F85, 700 Series	8085		7,500	12,536	10/78	2,000	2,000	4,000	NA

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Eagle Computers	Eagle II	Z80-A		2,995	2,995	11/81	5,700	300	6,000	
	Eagle III	Z80-A		3,995	3,995	02/82	1,900	100	2,000	NA
	Eagle IV	Z80-A		5,995	5,995	02/82	1,400	100	1,500	
						TOTAL	9,000	500	9,500	
Epson America	QX-10	Z80		2,495	3,000	03/83	0	-	0	NA
(U.S. Only)	HX-20	6301		795	795	10/82	8,000	-	8,000	NA
						TOTAL	8,000	-	8,000	NA
Exidy Systems, Inc. *	Sorcerer	Z80		1,495	2,890	08/78				X
	80/1	Z80		1,495	5,500	03/80	10,000	10,000	20,000	X
	80/2	Z80		1,495	7,295	03/80				X
Facit/Dataroyal	DTC	Z80-A		3,995	3,995	12/81	700	-	700	1,500
Findex, Inc. *	100	Z80		4,500	5,980	07/79	24	6	30	X
	128	Z80		8,230	8,980	--/80	0	1	1	X
	234	Z80		6,980	8,500	01/81	195	625	820	X
						TOTAL	219	632	851	X
Franklin Computer	ACE 1000	6502		1,395	1,395	08/82	16,000	1,000	17,000	120,000
	ACE 1200	6502		2,495	2,495	03/83	0	0	0	60,000
						TOTAL	16,000	1,000	17,000	180,000
Gavilan Computers	Gavilan	8088		4,990	4,991	--/83	0	0	0	NA
General Robotics	Polaris	LSI-11		13,000	13,000	04/78	0	100	100	X
						TOTAL	0	100	100	
Gnat Computers, Inc. *	System 10	Z80-A, 8085		4,650	6,100	12/79	150	50	200	X
	System 10M	Z80-A, 8085		5,450	7,000	10/80	80	20	100	X
	System 10H	Z80-A, 8085		8,350	8,350	07/81	5	0	5	X
						TOTAL	235	70	305	X
Grid Systems	Compass Cptr.	8086, 8087		8,100	9,210	12/82	38	2	40	5,000
Hardy Computer Corp.	801	Z80-A		1,350	3,000	06/80	450	400	850	NA
Harris	804	NA		NA	NA	NA	2,850	1,800	4,650	X
Hewlett-Packard	9816A/S	68000		3,650	5,000	11/82	400	600	1,000	9,000
	9825	HP		5,900	10,900	01/76	11,540	19,760	31,300	500
	9826A/S	68000		9000	11,803	06/81	3,200	4,800	8,000	3,500
	9830	HP		4,900	16,500	11/72	5,000	5,000	10,000	X
	9835	HP		9,000	13,200	12/78	3,540	4,460	8,000	500
	9836A/S	68000		12,000	14,500	01/81	2,050	2,600	4,650	6,000
	9845	HP		12,000	28,800	11/77	6,700	9,800	16,500	1,200
	83	HP		2,250	2,550	01/81	2,500	2,500	5,000	1,000
	85	HP		2,750	3,550	01/80	28,000	29,450	57,450	19,000
	86	HP		1,795	3,700	07/82	5,000	5,000	10,000	20,000
	87	HP		2,495	4,790	03/82	4,000	4,000	8,000	15,000
	120	Z80		2,775	2,775	12/82	550	0	550	6,500
	125	Z80		4,950	6,200	09/82	7,150	950	8,100	4,500
						TOTAL	79,630	88,920	168,550	86,700
HIS	6/10	HIS		3,995	5,000	--/83	0	0	0	10,000
	SPD10/20, 10/25	NA		6,090	12,000	06/70	6,500	3,700	10,200	X
IMSAI *	VDP-40	8085		5,300	5,300	--/78	380	20	400	X
	VDP-80	8085		7,800	7,800	--/77	670	130	800	X
						TOTAL	1,050	150	1,200	
Information Support	Voyager I	8085		4,995	4,995	04/81	48	0	48	X
Systems, Inc. *	Voyager II	8085		9,995	9,995	04/81	48	0	48	X
						TOTAL	96	0	96	X
IBM	5100	IBM		6,300	13,000	11/75	4,300	1,000	5,300	X
	5110	IBM		9,900	17,000	02/78	13,500	2,600	16,100	X
	5120	IBM		9,340	15,000	02/80	6,500	1,600	8,100	X
	5150 (PC)	8088		1,565	4,500	10/81	224,900	5,100	230,000	NA
	PCXT	8088		4,995	7,500	2Q/83	0	0	0	NA
	Sys/23 Datamaster	8085		9,830	12,530	07/81	18,700	6,300	25,000	NA
	3471-3-4	IBM		NA	NA	NA	2,600	31,700	34,300	X
						TOTAL	270,500	48,300	318,800	
ICL	1500	ICL		NA	NA	NA	1,730	-	1,730	X
Infotecs	IMP	IM 6100		10,000	15,000	09/77	855	128	976	NA
Intertec Data Systems	Super Brain	Z80-A		2,495	2,795	10/79	17,130	10,370	27,500	NA
	Super Brain QD	Z80-A		3,495	3,695	04/80				NA
	Compustar	Z80-A		1,995	3,500	01/81	6,080	4,120	10,200	NA
						TOTAL	23,210	14,490	37,700	
Konix International	System 80	Z80		3,700	4,000	06/78	53	14	67	X
Corporation	System 81	Z80		3,700	4,100	01/80	18	1	19	X
						TOTAL	71	15	86	
Lanier	Computer EZ	Z80		7,495	9,200	07/81	3,450	-	3,450	NA
Mad Computers	Mad 1	80186		3,000	6,000	06/83	0	0	0	NA
Micro Business Applications	Micron 740	Z80, 8085		25,000	30,000	03/80	29	0	29	X
Micro Expander	Expander	Z80		2,200	4,250	11/81	60	40	100	X
Micro Source	M-600P-Voyager	Z80-A		3,900	3,900	06/81	3,900	100	4,000	20,000
Micro Technology Unlimited	MTU130 Series	6502, 68000, Z80		3,350	4,450	09/81	1,100	100	1,200	NA
Microstar Inc *	Microstar I, II	Z80		13,000	18,000	12/78	5	0	5	X
Mohawk	21/10	Z80		7,000	10,000	NA	5,400	1,760	7,160	NA
Momentum Computer	Minimax	6502		6,950	6,950	01/80	320	830	1,150	X
	32	68000		10,000	13,500	03/82	30	45	75	300
	32E	68000		14,000	17,000	01/83	0	0	0	
	32/4	68000	b	10,000	13,500	12/82	1	0	1	500
						TOTAL	351	875	1,226	800
Monroe Systems	OC 8820	Z80-A		4,385	4,385	12/81	1,500	800	2,300	2,500
for Business	EC 8800	Z80-A		3,295	3,295	12/81	500	200	700	
						TOTAL	2,000	1,000	3,000	2,500

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NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE IN DOLLARS BASIC	PURCHASE PRICE IN DOLLARS AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	SHIPMENTS NEXT 12 MONTHS
Morrow Designs	Decision I	Z80		5,000	7,000	04/81	220	80	300	NA
	Microdecision			1,500	2,400	09/82				
Multitech Systems	MT 500	Z80		4,795	4,995	12/81	110	10	120	X
NBI, Inc.	System One	6810		13,000	13,000	Q1/842	-	-	-	NA
NCR	7500	NCR		7,500	9,500	--/79	2,000	4,100	6,100	500
	Decision Mae	Z80-A, 8088		2,680	4,000	04/83	0	0	0	NA
						TOTAL	2,000	4,100	6,100	
	Worksaver	SEE CONVERGENT								
NEC Information Sys. (U.S. Only)	205	NEC		6,500	11,039	07/80	600	-	600	X
	200	NEC		4,500	6,990	06/82	850	-	850	NA
	PC 8000	NEC		995	2,300	05/81	25,000	-	25,000	NA
	APC	8086		3,298	4,930	07/82	6,000	-	6,000	NA
						TOTAL	32,450	-	32,450	
Non-Linear	Kapro II	Z80		1,795	1,795	03/82	5,600	1,400	7,000	80,000
	Kapro 10	Z80-A		1,995	2,795	06/83	0	0	0	
						TOTAL	5,600	1,400	7,000	
Northern Telecom	340	NA		NA	NA	NA	18,108	39,500	57,608	NA
	350	NA		NA	NA	NA				
	405	NA		NA	NA	NA				
	530	NA		NA	NA	NA				
North Star Computers	Advantage Series	Z80-A		3,995	4,295	09/81	10,900	2,000	12,900	
Northwest Microcomputers *	IVMS 85/P	8085		7,200	7,200	01/78	25	3	28	X
Novell Data Systems	Nexus I	Nexus		12,000	12,000	04/81	578	248	826	NA
Octagon Computer Systems	Octagon 8/6	Z80/8088		4,695	6,297	04/83	0	0	0	NA
Odell Ind. *	System 85	8085A		10,450	15,550	06/78	30	0	30	X
Olivetti	P-6060	Olivetti		13,000	13,000	--/77	1,000	-	1,000	X
(U.S. Only)	P-6066	Olivetti		11,600	11,600	03/81	1,600	-	1,600	NA
						TOTAL	2,600	-	2,600	
Olympia USA (U.S. Only)	Portable Cptr.	6502		2,380	2,495	06/82	650	-	650	1,500
Ontel	OP-1	8085		5,000	6,500	--/74	22,000	18,000	40,000	NA
	150X	8085A		4,600	6,500	06/81	5,000	5,000	10,000	NA
						TOTAL	27,000	23,000	50,000	NA
Osborne Computer Co.	Osborne I	Z80		1,795	1,795	07/81	106,700	20,300	127,000	120,000
	Executive	Z80		2,500	2,500	--/83	0	0	0	NA
						TOTAL	106,700	20,300	127,000	120,000
OSM Computer Corp.	Zeus Series	Z80		4,595	6,595	01/80	500	200	700	NA
Otrona Corporation	Attache	Z80-A		3,995	3,995	03/82	4,700	0	4,700	20,000
Panasonic Co.	JD 850	8085		10,500	11,500	06/80	20	-	20	X
(U.S. Only)	JD 740	8085		7,000	9,500	10/81	5	-	5	X
	JR 800	6802		499	499	09/83	0	0	0	NA
						TOTAL	25	-	25	
Pentel of America Ltd. (U.S. Only)	PS-850S	Z80-A		13,000	13,000	1Q/83	0	0	0	NA
Peripheral Systems	Eagle	Z80-A		3,495	3,550	02/83	0	0	0	30,000
Perkin Elmer	3500	NA		NA	7,000	--/78	3,590	1,580	5,170	NA
Pertec Computer Corp.	MITS 300/25/55	8080		8,080	13,800	--/77	1,100	175	1,275	X
	3205	68000		5,000	5,000		0	0	0	NA
						TOTAL	2,770	3,045	5,815	
Polymorphic Systems	8813	8080		4,700	5,801	09/77	2,650	500	3,150	X
	Twin Systems	8080		6,000	7,500	07/78	90	85	175	X
	88HD	8080		10,000	15,000	03/81	50	75	125	X
						TOTAL	2,790	660	3,450	
Processor Industry *	Sol I, II, III, IV	8080A		3,000	6,000	--/77	4,500	500	5,000	X
Psytek, Inc.	Psytek 770	Z80		4,750	7,200	07/79	30	5	35	X
Quasar Data Products	QDP 100	Z80-A		4,695	4,695	01/80	2,800	200	3,000	NA
	QDP 200	Z80-A		2,995	2,995	12/82	225	25	250	NA
	QDP 300	Z80-B		3,995	3,995	02/83	0	0	0	NA
						TOTAL	3,025	225	3,250	
Quay	900 Series	Z80		4,995	9,000	09/79	1,200	300	1,500	NA
	500 Series	Z80		2,495	3,215	03/80				NA
R2E of America	X Product	Z80		8,500	8,500	01/79	270	-	270	NA
(U.S. Only)	XM	Z80		NA	20,000	03/82	20	20	40	NA
						TOTAL	290	20	310	
Racal Milgo	4000 Series	NA		3,800	6,750	06/80	8,200	-	8,200	NA
Randal Data Systems *	R-100 Series	Randal		14,000	17,000	10/75	257	13	270	X
Retail Sciences	Clerk 300	Z80		12,000	12,000	08/79	85	50	135	X
Sanyo	MBC-2000	8085		3,495	3,495	05/82	900	-	900	NA
(U.S. Only)	MBC-3000	8085		6,495	6,495	06/82	2,000	-	2,000	NA
	MBC-1000	Z80-A		1,995	1,995	05/82	16,000	-	16,000	NA
	MBC-555	8088		995	995	09/83	0	-	0	NA
						TOTAL	18,900	-	18,900	NA
Scientific Data Sys., Inc.	SDS 400 Series	6502		5,500	8,400	03/79	800	80	880	500
	SDS 4000	6502		7,400	7,400	05/83	0	0	0	300
						TOTAL	800	80	880	800
Seattle Computer	Gazelle	8086		5,995	5,995	09/82	60	2	62	500
Seequa	Chameleon	8088		1,995	1,995	--/82	290	10	300	8,000
Sharp Electronics Corp.	YX 3200-100	Z80-A		3,495	5,000	05/81	500	-	500	800
(U.S. Only)	YX 3200-200	Z80-A		4,995	7,000	01/82	250	-	250	
						TOTAL	750	-	750	800
Sinclair (U.S. Only)	ZX/80, 81	NA		100	150	01/82	500,000	-	500,000	NA
Solid State Technology	8185	8085A								
Solo Systems, Inc.	1116	68000		35,000	35,000	06/83	0	0	0	200
Sony Corporation (U.S. Only)	SMC-70	Z80-A, 8086		1,475	3,600	10/83	0	-	0	NA

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NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE IN DOLLARS BASIC	PURCHASE PRICE IN DOLLARS AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	SHIPMENTS NEXT 12 MONTHS
Sord (U.S. Only)	Sorius M23P	Z80-A		2,595	2,595	--/83	0	-	0	NA
Space Byte Computer *	DBM/1, /2	8085,Z80		6,000	15,000	07/78	65	10	75	X
Sperry Univac	UTS40	Sperry		4,000	9,500	--/81	5,575	9,250	14,825	NA
STM Electronics	Pied Piper 1	Z80-A		1,299	1,299	--/83	0	0	0	NA
Sumicon, Inc.	System 830	Z80-B		6,695	7,495	01/83	0	0	0	NA
Systel Computers, Inc.	Model 11	8085, Z80		8,950	8,950	01/81	50	200	250	X
	Model 15	8085, Z80		9,950	9,950	01/81				X
Tandy/Radio Shack	TRS-80/I	Z80		499	1,000	09/77	247,500	27,500	275,000	X
	TRS-80/II	Z80		3,450	6,500	07/79	102,000	14,000	116,000	NA
	TRS-80/III	Z80		700	2,000	09/81	79,000	14,000	93,000	NA
	TRS-80/IV	Z80		999	1,999	--/83	0	0	0	NA
	TRS-80 Color	6809		299	399	09/81	88,000	24,000	112,000	NA
	TRS-80/16	68000		4,999	9,000	--/82	8,000	1,000	9,000	NA
	TRS-80-100	80C85		799	850	--/83	0	0	0	NA
						TOTAL	524,500	80,500	605,000	
Tano Corp.	Outpost II	6800		4,995	5,575	08/78	1,320	160	1,480	NA
	Outpost 7	6800		3,000	4,000	08/77	180	20	200	X
						TOTAL	1,500	180	1,680	
Tektronix	4051	6800		5,995	12,500	12/75	9,620	5,080	14,700	NA
	4052	Tek		9,950	16,500	07/79	3,920	1,880	5,800	NA
	4054	Tek		20,100	22,500	07/79				
						TOTAL	13,540	6,960	20,500	
Telcon Industries, Inc.	Zorba	Z80-A		1,995	1,995	10/82	950	0	950	65,000
		Z80-A		2,395	2,395	04/83	0	0	0	
						TOTAL	950	0	950	65,000
Teleram Communications Corporation	T-3000 Series	Z80		2,995	3,200	01/83	0	0	0	20,000
Televideo Systems, Inc.	TS 801	Z80		3,295	3,295	09/81	1,540	380	1,920	X
	TS 803	Z80-A		2,495	2,495	03/83	0	0	0	NA
	TS 816	Z80		12,995	12,995	02/82	360	90	450	2,800
	TS 800A	Z80		1,695	1,695	09/81	6,840	1,710	8,550	20,000
	TS 802	Z80		3,495	3,495	12/81	2,085	520	2,605	6,000
	TS 802H	Z80		6,995	6,995	12/81	5,300	1,330	6,630	12,000
	TS 806	Z80		7,195	7,195	09/81	2,080	520	2,600	5,500
	TS 1603	8088		3,495	3,495	04/83	0	0	0	NA
						TOTAL	18,205	4,550	22,755	
Texas Instruments	99/4	TI9900		650	1,000	11/79	19,850	150	20,000	X
	99/4A	TI9900		150	150	07/81	495,500	4,500	500,000	1,000,000
	742	NA								
	770	NA		5,745	10,000	--/77	11,050	30,500	41,550	X
	771	NA								
						TOTAL	526,400	35,150	561,550	1,000,000
Toshiba America (U.S. Only)	T-100	Z80		2,400	3,000	11/82	200	-	200	1,200
	T-200	8085		3,750	5,500	08/81	400	-	400	300
	T-250	8085		4,750	7,000	08/81	1,000	-	1,000	1,200
						TOTAL	1,600	-	1,600	2,700
Vector Graphic	System B, MZ	Z80		4,314	5,400	01/79				
	1600	Z80		3,995	3,995	08/80	12,850	3,096	15,946	2,600
	2800	Z80		7,295	7,295	07/80				
	2600	Z80		5,195	5,195	03/81				
	Memowrite	Z80		8,950	8,950	01/79	300	100	400	X
	3100	Z80		5,795	5,795	07/81				
	3105	Z80		8,495	8,495	07/81	1,281	225	1,506	250
	3032	Z80		12,795	12,795	05/81				
	3005	Z80-B		5,495	5,495	01/82	887	66	953	1,200
	Vector 4/20	Z80/8088		4,750	4,750	09/82	849	236	1,085	5,000
	Vector 4/30	Z80/8088		5,995	5,995	09/82	1,085	268	1,353	5,000
						TOTAL	17,252	3,991	21,243	14,050
Victor	9000			4,995	8,000	04/82	5,000	15,000	20,000	80,000
Wang Laboratory	PCS 1	Wang 2200		5,400	8,000	04/76	840	320	1,160	X
	PCS 2	Wang 2200		4,800	10,145	04/77	3,045	1,960	5,005	X
	PCS 3	Wang 2200		6,500	9,000	04/80	25	10	35	X
	Wang PC	8086		2,695	2,695	01/83	0	0	0	40,000
						TOTAL	3,910	2,290	6,200	40,000
Wave Mate *	Series 2000	6800		2,395	3,000	01/79	100	100	200	X
Wicat	System 150	68000		8,500	8,500	10/81	300	150	450	600
Xerox	510	8085A		15,000	17,000	09/79	1,550	2,550	4,100	X
	515	8085A		5,700	6,300	03/81	420	2,050	2,470	X
	820	Z80	c	2,995	4,995	06/81	30,000	6,000	36,000	NA
	16/8	8086,Z80A		3,995	4,000	08/83	0	0	0	NA
						TOTAL	31,970	10,600	42,570	
Zeda Computers Int'l	Zeda 580	Z80		6,038	6,250	06/79	500	300	800	NA
	Zeda 520	Z80		3,995	3,995	02/81	75	0	75	NA
						TOTAL	575	300	875	
Zenith	Z89	Z80, 8080		2,000	4,000	10/79	25,000	25,000	50,000	NA
	Z90	Z80, 8080		2,499	4,166	10/81				NA
	ZF-1100	8085/8088		2,899	5,000	09/82				NA
	ZW-100	8085/8088		5,799	7,000	03/83	0	0	0	NA
						TOTAL	25,000	25,000	50,000	
Zentec	Series 2000	8085A		8,950	8,950	03/83	0	0	0	NA
	9003, ZMS	8085A		2,395	NA	--/75	29,300	1,231	30,531	X
	8000	8085A		17,500	NA	4Q/81	5,800	9	5,809	NA
	Cobra	8085A		1,250	NA	4Q/82	333	3	336	NA
	8031	8085A		14,500	NA	3Q/83	0	0	0	NA
	Peacock	8086		6,995	NA	5Q/83	0	0	0	NA
						TOTAL	35,433	1,243	36,676	
Zilog	MCZ1	Z80		5,000	6,000	--/77	1,330	2,670	4,000	100
	MCZ2	Z80		11,500	11,500	06/80	1,020	830	1,850	50
						TOTAL	2,350	3,500	5,850	150

	U.S.	International	World
TOTAL OF ABOVE	4,455,758	1,287,234	5,742,992
TOTAL OTHER VENDORS	8,400	11,600	20,000
TOTAL	4,464,158	1,298,834	5,762,992

Notes: a Corporate name was changed from Business Machines.
b Corporate name was changed from Computhink, Inc. - December, 1982.
c Xerox sells the 510 model in addition through Diablo under the Model 3000 name; however, the whole installed base is credited to Xerox.
* Not currently active in manufacturing or marketing desktop computers.
NA Data is not available.
X Model not in new production.

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REVIEW & FORECAST
Part II

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

DAVID MOSCHELLA,EDITOR SEPT. 30, 1983 ● V/19,NO.10,11 P.J. MCGOVERN,PUBLISHER

VALUE OF WORLDWIDE COMPUTER SHIPMENTS TO GROW 17.3% PER YEAR OVER 1982-87 PERIOD: END-USER DEMAND TO LEAD WAY

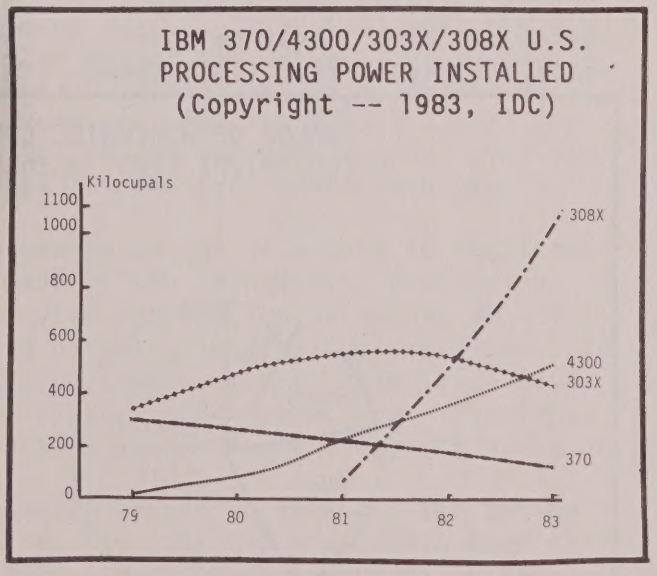
From mainframes to micros, the future of computing is now tied to the needs of an emerging class of demanding end users. Just as the 1970s proved to be the decade of the DP shop, the 1980s will see computers move into the office in a big way. And as the user base swells, the outlook for hardware sales looks bright. This steadily rising tide should lift all but the leakiest of boats.

Led by personal computing, on-line applications, text processing, and data base manipulation, users continue to show an almost insatiable demand for processing power. Consequently, system vendors are locked into an R&D-intensive price/performance war that shows no signs of ending. Minis challenge mainframes; desktops hit minis; and networks encompass all.

Some numbers. International Data Corporation (IDC), publisher of EDP/IR, forecasts that the value of worldwide shipments from U.S. suppliers will increase at a compound rate of 17.3% over the 1982-1987 period, from $34.4 billion to $76.6 billion. Shipments to the U.S. market will increase at 16.8% per year while international efforts will rise at an 18.3% annual rate. Led by desktop computers, worldwide unit shipments will grow at 44.8% per year.

The chart opposite depicts the accelerating pace of power consumption within the IBM world. In fact, in 1982, the processing power of the IBM mainframe installed base grew by 54%, and the power shipped in 1982 and 1983 will almost equal that of the previous 20 years. Mainframes remain healthy.

IDC coined the term "cupal" (not an acronym) as a relative performance measure. The number of cupals installed is derived by multiplying the cupal ratings of individual IBM machines by their respective installed populations. An IBM 360/20 has a rating of 1 cupal; the 3081K is rated at 675.



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VALUE OF U.S. COMPUTER SHIPMENTS, U.S.-BASED MANUFACTURERS, 1982-1987
(Copyright 1983 -- International Data Corporation)

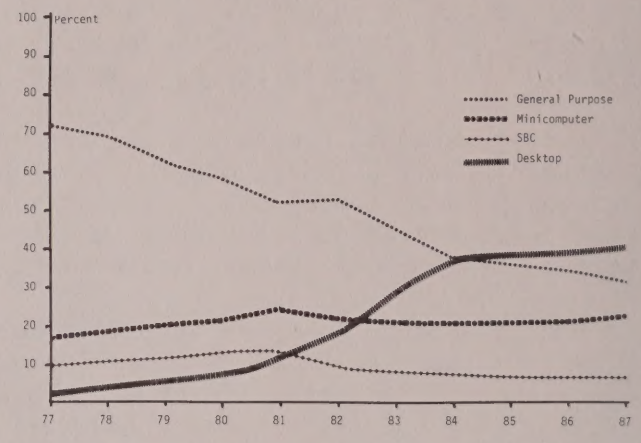
	1982 U.S. Shipments ($M)	1987 U.S. Shipments ($M)	Compound Annual Growth Rate
Mainframes	$11,780	$15,190	5.2%*
Minis	4,830	11,410	18.8
SBCs	1,990	3,110	9.3
Desktops	4,045	19,423	36.9

*Because mainframe shipments rates are highly cyclical, growth rates over a specific five-year period can be misleading, i.e, over the 1981-1987 period, mainframe growth is expected to be 10.1%.

The chart opposite shows the changing mix of processor markets over time. Although the value of desktop computer shipments will surpass those of general purpose in 1984, the relative rate of change will slow thereafter.

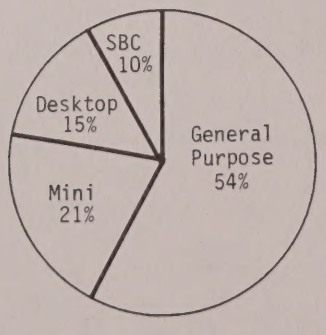
Perhaps more importantly, the chart gives an indication of how desktop shipments are affecting the share of both minis and SBCs. Note that the share of the market controlled by minis and SBCs peaked in 1981, and drops for the forecast period. 1981 also marks the real take-off point for the desktop market. EDP/IR believes that desktop sales are more likely to spur mainframe sales than limit them.

COMPOSITION OF U.S. COMPUTER SHIPMENT VALUE, 1977-1987
(Copyright 1983 -- IDC)

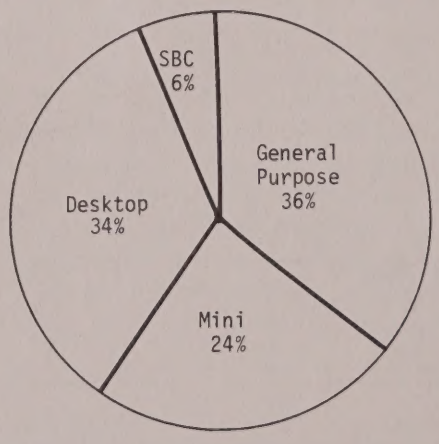


Note: Year markers represent end of year totals, i.e. the 1982 coordinates indicate total shipments during 1982.

VALUE OF WORLDWIDE COMPUTER SHIPMENTS, 1982-1987
(Copyright 1983 -- International Data Corporation)



1982
$38,010 Million



1987
$76,618 Million

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WORLDWIDE NEW-BUILT SHIPMENTS, GENERAL PURPOSE COMPUTERS
U.S. BASED MANUFACTURERS, 1981-1982
(Copyright 1983 -- International Data Corporation)

	1982			1981	
	$M	% Total	% Δ	$M	% Total
IBM	13,265	71.2	34.8	9,740	65.1
Amdahl	344	1.8	13.9	302	2.0
NAS	269	1.4	40.8	191	1.3
Magnuson	11	0.1	-72.5	40	0.3
IPL	15	0.1	-28.6	21	0.1
Cambex	2	*	0	2	*
PCM Peripherals	1,235	6.6	21.7	1,015	6.7
Subtotal PCMs	1,876	10.0	19.4	1,571	10.4
Total IBM Base	15,141	81.2	33.9	11,311	74.8
Honeywell	650	3.5	-19.1	803	5.3
Sperry	1,005	5.4	-11.5	1,135	7.5
Burroughs	729	3.9	-14.2	850	5.6
NCR**	239	1.3	0.4	238	1.6
CDC	421	2.3	4.2	404	2.7
DEC	291	1.6	68.2	173	1.2
Cray	145	0.8	40.8	103	0.7
Denelcor	8	*	-	-	-
Total Non-IBM	3,488	18.8	-8.4	3,806	25.2
Grand Total	18,629	100.0	23.2	15,117	100.0

*Less than 0.05%. **NCR considers its 9040, 9050, amd 9300 systems to be general purpose, but IDC classifies them as small business computers, resulting in lower general purpose shipment figures than NCR would claim.

Mainframes in vogue

Perhaps the dominant mainframe development over the last two years has been the sense of renewed enthusiasm for the high end of the market. Large terminal networks, increased emphasis on data base systems, the requirements of IBM's MVS/XA and the strong economic recovery are creating a huge demand for CPU cycles which IBM has estimated to be in the 50% per year range. Over the forecast period, the high end will increase its shipment share (see page 4).

In fact, although they are often referred to as the dinosaurs of the industry, mainframes are once again becoming part of the information processing frontier. As large corporations start to view information resources as strategic assets, the central MIS operation is becoming increasingly critical. In just about any industry one looks at, leading companies are using large data bases to build new products or streamline company-wide operations. Flexible and effective information systems are emerging into a major competitive weapon.

On-line systems also continue to be a major source of demand. The nation's largest banks, with their huge ATM networks, are only the most visible of the giant, high-volume transaction networks that are becoming essential to many businesses. Mainframes are also at the center of a lot of decision support and artificial intelligence efforts, with the Japanese fifth generation project merely the most publicized. These expert, knowledge-based systems will help sustain demand throughout the decade.

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Thus far, however, the mainframe resurgence has been restricted to the IBM/PCM world. Burroughs and Honeywell are just now getting their big systems to market and Sperry won't start shipping its 1100/90s until 1984. EDP/IR doubts whether these companies can match the kind of growth enjoyed by IBM.

1982 marked a significant change in the financial performance of U.S. mainframe suppliers. Over the 1976-1981 period, Burroughs, Univac, NCR, Control Data, and Honeywell (Bunch) all grew faster than IBM. In 1982 and again in 1983 that trend has been turned around. In 1982, the non-IBM mainframers grew collectively at a dismal 2.0% while IBM expanded 18.2%. Although the Bunch are doing slightly better in 1983, the end results will look much the same.

There are, however, at least two significant exogenous factors. IBM has caught its traditional rivals between product cycles and IBM's efforts to convert lease and rental users to purchase are inflating its actual performance to some extent. Nonetheless, IBM's traditional rivals are being squeezed by slow growth and low profits at time when increased R&D is being required.

This is not to imply that the Bunch are standing still. CDC continues to mine the lucrative services and peripherals markets. NCR has revitalized its product line and is pursuing lots of new markets. Honeywell has come out with some innovative small computer products. Sperry has won several big military contracts and reports healthy orders for its delayed 1100/90 series. Burroughs, however, has over the last year remained eerily quiet.

Joint ventures are also proving popular. Bunch members are teaming up in peripheral projects and are all part of the CDC-inspired Microelectronics and Computer Technology joint effort. They are also cutting deals with both Japanese firms and start-ups such as Convergent Technologies. The Bunch have realized that they need outside help if they are to remain full-line suppliers.

The IBM plug-compatible manufacturers face a different situation. After a weak and unprofitable 1982, both Amdahl and NAS are enjoying a very strong 1983. On the other hand, suppliers of 4300-type systems are feeling the heat

INFORMATION PROCESSING REVENUES -- LEADING MANUFACTURERS
(Copyright 1983 -- International Data Corporation)

	1977	1982	Compound Growth	1982 Growth
IBM	14,765	28,934e	14.4e	20.2e
Burroughs	2,127	4,186	14.5	22.9*
DEC (6/30)	1,059	3,881	29.7	21.4
NCR	2,521	3,526	6.9	2.7
CDC	1,513	3,301	16.9	5.8
Sperry (3/31)	1,726	2,818	10.3	-0.1
HP (10/31)	588	2,168	29.8	22.4
HIS	1,037	1,685	10.2	(5.0)
Wang	178	1,159	45.5	35.4
STC	162	1,079	46.1	17.0
Total	25,676	52,737	15.5	16.2

Notes. IBM 1982 figures are IDC estimates since IBM no longer breaks out its typewriter business separately. *Burroughs 1982 growth is primarily due to the aquisition of Memorex.

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of IBM's aggressive price cutting and new products, and 1983 prospects aren't bright. PCM peripheral makers are also having lots of problems. Delays in 3380-type drives have brought Storage Technology down to earth. By April, IBM had shipped 15,000 3380s; PCMs STC, CDC and Memorex are just getting started. To limit PCM impact, IBM has been trying to convert its 3380 base to purchase.

Thanks to high-volume sales of IBM's large 3081 processors (840 in the U.S. alone), 1982 turned out to be an exceptionally good year for the mainframe market with the value of worldwide shipments up 23% over a weak 1981. Thanks to a pick-up in international sales, 1983 will show growth of 16.4%. Since IDC does not expect IBM's Sierra series until 1985, 1984 looks like an off year.

Sales of 4300 machines are dwindling. The system that rocked the industry in 1979 is now some four years old, and replacement products will continue to be announced over the next twelve months, resulting in considerable churning of the size class 2, 3, 4, and 5 bases over the 1984-85 period. With the introduction of the S/36, S/38 sales will tend to focus on the larger models. Shipments of S/38s to the U.S. market reached some $500 million in 1982.

This segment of the market has come under increasing attack from vendors of minicomputers, and even from some microprocessor-based systems. But over the last 18 months, IBM has emerged as a very aggressive price competitor in the mid-range market. Magnuson was one who couldn't keep up, but even some of IBM's traditional mainframe rivals are feeling the price pressure. The price/performance of IBM's 4300 replacements -- code named Glendale and Olympia -- will have significant repercussions for mini and mainframe vendors alike.

With the entrance of Fujitsu, Hitachi, and NEC, competition in the supercomputer market has heated up, and rumors persist that IBM is taking a hard look at the market. But given the high development costs, this market will be unable to support many vendors until vector processing machines begin to penetrate commercial environments. If they can't, supercomputer competition will come down to U.S. vs Japanese supremacy, with all its political ramifications.

VALUE OF U.S. GENERAL PURPOSE SHIPMENTS BY SIZE CLASS, 1981-1987
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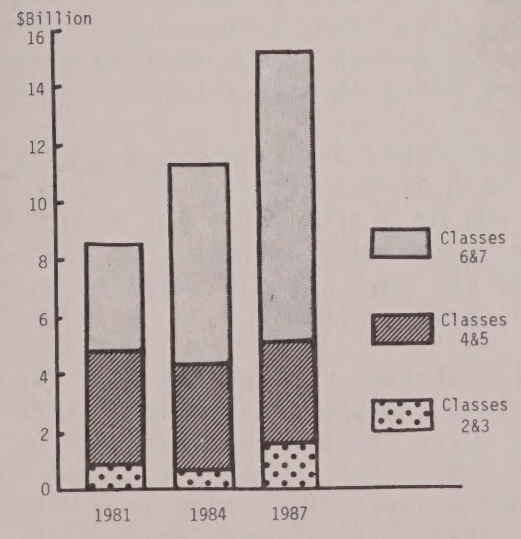

IDC Size Classes for IBM CPUs

Model	Class
System/38-3	2
370/115	3
System/38-5	3
4331-1	3
370/138	4
4331-2	4
4341-1	4
370/148	5
4341-2	5
370/158	6
3031	6
3083	6
370/168	7
3033	7
3081	7

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1982 U.S. GENERAL PURPOSE INSTALLED BASE BY SIZE CLASSES,
UNITS AND DOLLAR VALUE
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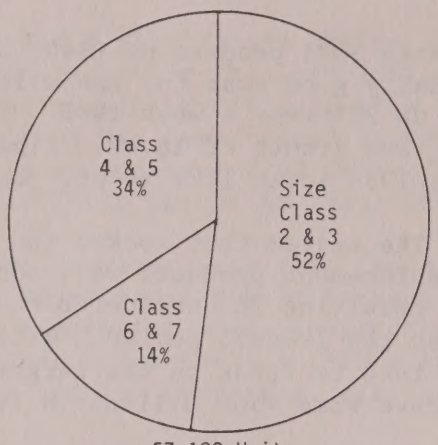
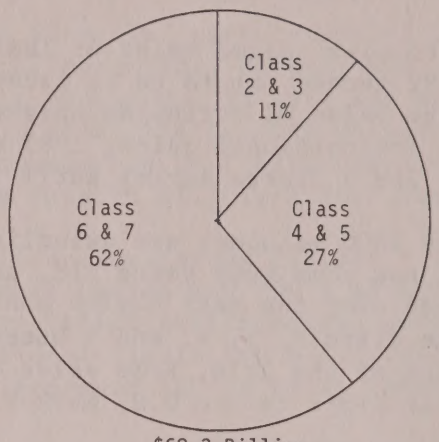


57,180 Units



$68.3 Billion

Turmoil in the mini market

The sudden change in the financial performance of the major mini makers is perhaps the best evidence of how quickly this market is changing. 1982 saw growth at Data General take a pounding; in 1983 DEC, Hewlett-Packard Prime, and Tandem have felt earnings squeezes. For most of these companies, this is the first time that they've had to deal with anything but growth and accolades. Only Wang, with its text processing emphasis, has thus far remained immune.

The minicomputer market has always been more affected by the economy than the mainframe sector which is heavily product-cycle driven. But even a return to a robust economy will not guarantee a re-run of the high growth 1970s. Faced with changing markets and competitors, life has gotten more difficult.

With significant competition from desktop computers, start-ups, and more head-to-head battles with IBM, mini makers have been scrambling to shore-up their product lines. Just as mainframers were late in getting to the mini market, mini vendors have sat out of the early rounds of the desktop market, and 1984 will be the first year when desktops bring in significant revenues.

DG and Honeywell have already put their minis on a chip, and EDP/IR expects other mini vendors to follow. DEC may wish it had followed this approach with its software-starved Professional 350, and HP has talked about a 3000-based micro. Microprocessor-based, single and multi-user systems that run existing mini software have emerged as one of the few ways for mini vendors to differentiate their desktops from the entrenched competition.

With sales of small minis relatively sluggish, most of the mini vendors are also looking increasingly to office systems and powerful superminis for future growth. Data General shook up the group with its powerful MV/10000 which has since been followed by Prime's high-end 9950. DEC, which got caught napping at the high end, is scrambling to get out a larger Vax, sometimes dubbed the 790, sometimes the 810. This new generation of superminis squares off directly with IBM's 4300 products in many user environments, especially as IBM continues to stress the scientific/engineering performance of its 4300 systems.

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Mini forecast

IDC segments the minicomputer market into three categories -- microminis, typified by DEC's LSI/11 products; traditional minis, generally 16-bit and characterized by DEC's PDP-11 products; and superminis, usually 32-bit and typified by DEC's Vax/750 and /780 products. In terms of price, microminis have an average purchase price of about $3,500; traditionals range from $10,000 to around $50,000; superminis go from as low as $50,000 up towards $500,000.

Each of these markets is facing changing competition. At the low-end, the growth of micromini shipments is being blunted by increasingly powerful and flexible desktop computers. IDC sees this market remaining virtually flat over the 1982-87 period. Although unit shipments will grow at 3.1% per year, falling prices will leave shipment revenues similar to 1982's $250 million. A large OEM software base remains this market's major raison d'etre.

After a long period of dormancy characterized by both slow growth and few product introductions, the traditional minicomputer market should enjoy a mild rebirth over the forecast period. New emphasis on small multi-user systems and scaled-down 32-bit processors should make for lots of new products. Growth rates, however, continue to prove that this is a rather mature market. From 1982-87, worldwide unit shipments will rise 10.6%/year with value rising 8.1%.

Superminis continue to be where the action is for mini suppliers who are engaged in a price/performance race reminiscent of the mainframe market. Worldwide supermini shipment value will increase at 24.3% over the forecast period, reaching an impressive $12.3 billion by 1987. Because of their fast growth, superminis continue to attract lots of startups and venture capital, with fault tolerant and multiple microprocessor-based systems particularly in vogue.

WORLDWIDE MINICOMPUTER SHIPMENTS BY U.S.-BASED MANUFACTURERS, 1981-1982
(Copyright 1983 -- International Data Corporation)

	1982 $M Revenue	1981 $M Revenue	1982 % Share*	1982 Units Shipped	1981 Units Shipped	1982 % Share*
DEC	3,700	3,340	37.8	83,590	74,180	47.4
Hewlett-Packard	1,608	1,233	16.4	14,810	12,004	8.4
Data General	804	764	8.2	17,050	16,800	9.7
Honeywell	718	623	7.3	2,912	6,659	1.7
Texas Instruments	650	402	6.6	18,540	9,810	10.5
IBM	603	496	6.1	11,900	9,500	6.7
Prime	435	365	4.4	2,025	1,799	1.1
Tandem	335	243	3.4	1,502	1,401	0.9
Perkin Elmer	198	225	2.0	1,670	1,835	0.9
SEL	170	122	1.7	977	700	0.5
Harris	132	84	1.3	442	402	0.3
Modcomp	92	87	0.9	618	776	0.4
CAI	68	72	0.7	10,585	4,245	6.0
GAI	58	82	0.6	1,370	1,730	0.8
Sperry	44	133	0.4	191	1,562	0.1
Others	193	145	2.0	8,318	7,319	4.7
TOTAL	9,808	8,416	99.8	176,500	150,722	100.1

*Percentages do not add to 100 due to rounding.

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WORLDWIDE MINICOMPUTER SHIPMENTS, U.S.-BASED MANUFACTURERS, 1982-1987
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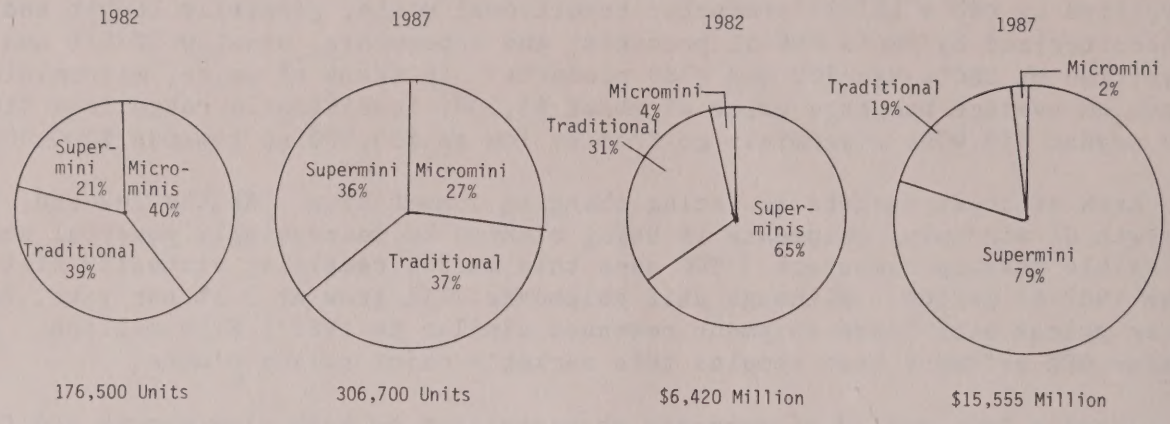


Figures do not include add-on peripherals and thus do not match the numbers on the red pages.

Small business market, vertical opportunities

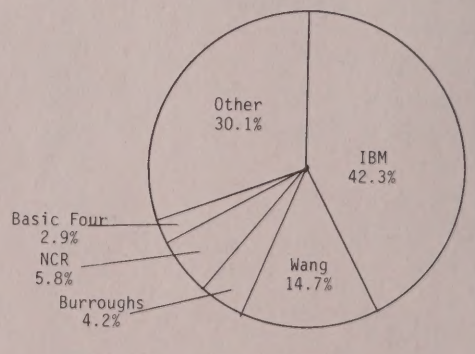
Although the small business market is seemingly besieged by problems and competition -- desktops, minis, support costs, the recession, etc. -- there are still opportunities. Desktop computers often do not have the software needed for many small business tasks, and vendors who sell through retail outlets are not equipped to offer high levels of support. A well positioned product in the right vertical market can still be quite successful as many new and experienced users still like to buy fully packaged systems.

The big news in this market was certainly IBM's announcement of the System/36. But the S/36 as announced serves only the upper segment of the market. IBM's Datamaster has not been particularly successful at the low end, and thus EDP/IR expects that IBM will announce a smaller version of the S/36, both to pick up some of the small System/34 base and to better to compete with companies such as Altos. IBM has called the S/36 the "first of a family."

At the low-end, SBC vendors are scrambling to incorporate their software with today's powerful microprocessors and winchester disks so that they can better compete with desktop prices. Since the primary competition is normally from desktop computers, many SBC vendors are focusing much of their effort on the low and middle parts of the market, with the hope of future upgrades.

Despite the opportunities, SBCs remain a difficult market which is likely to produce as many losers as winners. IDC forecasts that U.S. units shipments will grow at 11.3% over the 1982-1987 period, with value rising 9.3%. The figures for the international market are 11% and 8%, respectively.

1982 U.S. SBC SHIPMENTS
(Copyright 1983 -- IDC)



$1,990 Million

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MARKET SEGMENTATION OF WORLDWIDE VALUE-ADDED SERVICES MARKET,
U.S.-BASED VENDORS, 1982-1987
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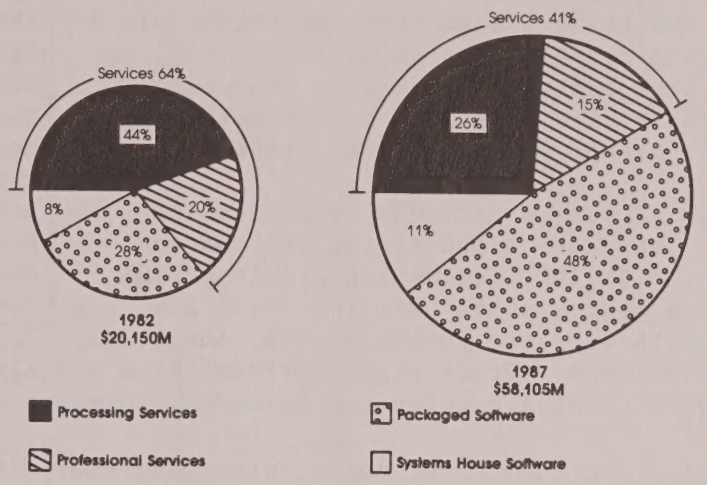

In 1982, the worldwide revenues of value-added suppliers -- software along with processing and professional services -- reached $20.1 billion, just a shade under those for general purpose mainframes, and far above the revenues for any other industry sector. Although the importance of software has been recognized for some time, the magnitude of the software delivery industry has often gone unrecognized, perhaps because of its highly fragmented nature.

IDC expects the overall value-added market to expand at 23.6% per year through 1987, a remarkable rate given the size of the industry. In fact, in 1983 value-added services will become the largest market of all, and not even the fast-growing desktop computer market will be able to catch it. In terms of growth, packaged software will lead the way (37%), followed by system house software (32%), professional services (17%), and processing services (12%).

Given today's application backlogs, end-user demand, proliferating hardware, and rising programmer costs, a bright future for packaged software is assured. From mainframes to micros, the action is fast. Some key software areas:

- Mainframes. Data base management and fourth generation languages are gaining status. IBM's new relational Data Base 2 software signals the giant's recognition of the need for end user oriented facilities. Where would Sperry be without Mapper? All the mainframers continue to court third party groups for application software, not for the software revenues but to help sell hardware.

- Minis. Unix is steadily emerging as an industry standard among new and established vendors alike. Rumors persist that IBM will announce support of Unix on its 4300 machines. A standard operating system would help spur mini packaged software development activity.

- Micros. IBM's open architecture has opened the flood gates, and growth rates here will exceed 50% per year through 1987. Bundled, integrated WP/DP systems are also proving popular.

- Artificial Intelligence. Today's work on decision support systems and fifth generation computers will lead to important future markets.

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Processing services, some ups and downs

TOP 10 INDEPENDENT VALUE-ADDED SUPPLIERS (1982 REV. $M)	
ADP	$706
CSC	683
Geisco	585
EDS	562
McAuto	295
Tymshare	243
Arthur Anderson	188
Informatics	170
Shared Medical	166
Boeing Comp. Ser.	157

The lackluster 11.6% growth in the processing services market is due primarily to troubles in the plain vanilla timesharing market. A combination of falling hardware prices, the prolonged recession and competition from desktops will make long term timesharing growth difficult, except in specialized niches.

But this gloom is only a part of the processing services story. Transaction processing systems continue to flourish, with IDC forecasting growth of 18% over the next five years. Data base inquiries are also a hot area with expected growth of 23%, admittedly from a much smaller base. Processing services firms are also putting increased emphasis on personal computer sales and mainframe-to-micro links.

Given the demand for communications services and user difficulties in building and operating large teleprocessing networks, it's no wonder that over the last few years interest in packet switched networks has soared. EDP/IR counts ten vendors that have at least announced plans to enter this market, with Geisco, United Information Services, National Data Corp. and Computer Sciences among the value-added entrants. Because of their long experience with both remote computing and customized systems, some service companies see themselves as the logical builders of the inter and intra-company networks of the future. IBM and AT&T have their own ideas, of course.

Besides IBM and AT&T, other new competitors are emerging from specific industries such as banking, accounting and insurance, and the value-added market continues to be acquisition prone. IDC counted 138 takeovers in 1982, up from 125 in 1981. The most notable acquisition was Dun and Bradstreet's pick up of McCormack and Dodge, but the great majority are very small. A sluggish international business is another constant, with only remote problem solving companies doing a substantial overseas business.

SEGMENTATION, WORLDWIDE PROCESSING SERVICES MARKET
U.S.-BASED VENDORS, 1970-1987
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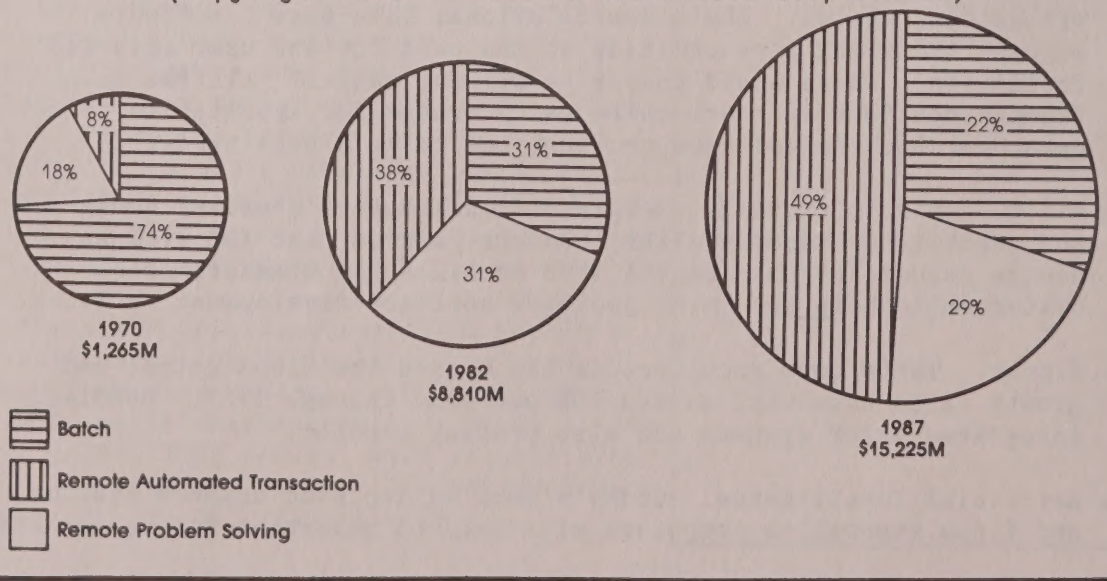

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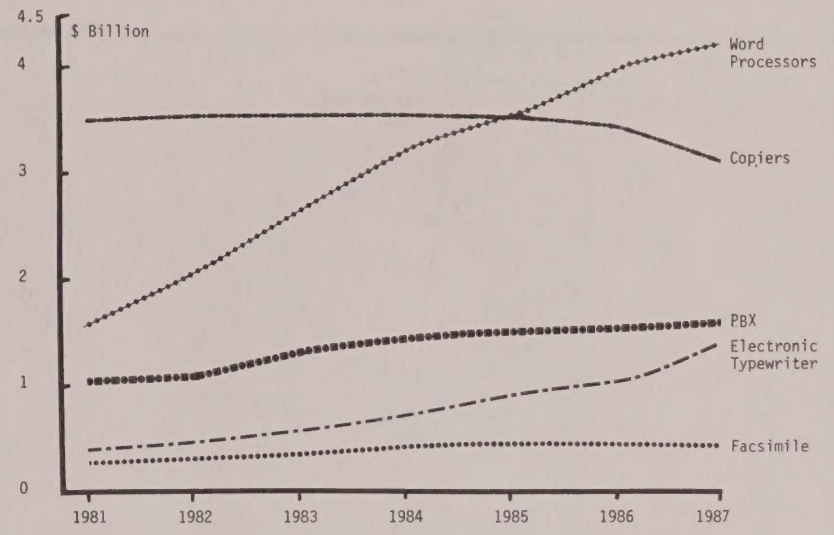
OFFICE AUTOMATION EQUIPMENT, VALUE OF SHIPMENTS ($M)
(Copyright 1983 -- International Data Corporation)

The data opposite is for equipment sales only; it does not include revenues for service, software, installation etc. For copiers, service and supply revenues can compare to sales. PBX figures reflect wholesale, if-sold assumptions. End-user PBX costs often include installation and may total as much as 2.5 times the wholesale figure. Electronic typewriter, fax, and WP auxillary costs are less significant.



Office rundown

The growth rates shown above should not be taken to mean that office automation has lost the hot market status of a few years ago. Since desktops, minis and even mainframes are all being used to automate office workflows, the equipment numbers above should be viewed merely as forecasts for specific types of devices, the sum total of which comprise only a small portion of total office automation spending.

The real office automation market includes everything from payroll processing to electronic mail to decision support to spreadsheets, and is thus as much software as hardware oriented. Nevertheless, the specialized products shown above are important parts of the overall office automation picture.

The leveling-off of the copier market has already sent several companies into chapter 11, and is the best reason why Xerox knows that, no matter how rocky the road, it must not fail in its return to the information processing business. Because the copier market is relatively saturated, only an opening up of the home market could inject significant growth into the market. Increasingly, copier firms are relying on revenues from service and supplies.

Typing-oriented machines -- word processors and electronic typewriters will both do well over the forecast period. Although desktop computers and, increasingly, minicomputers are being sold with text processing software, no desktop or minicomputer system on the market today can match the functionality of dedicated WP machines, and as long as this is true, growth will continue.

PBXs have attracted much more vendor attention than their 8.4% projected growth rate might seem to warrant. IBM's 17.7% stake in Rolm capped a series of major computer/PBX alliances, and PBX data switching capabilities are now a driving force in the market. The emergence of a competitive AT&T and its new Dimension 85 has also centered attention on PBXs. Although the PBX vs. local area network debate continues, there is now little doubt that digital PBXs will be an important part of many office automation systems.

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U.S. DATA ENTRY TERMINAL MARKET, 1982-1987
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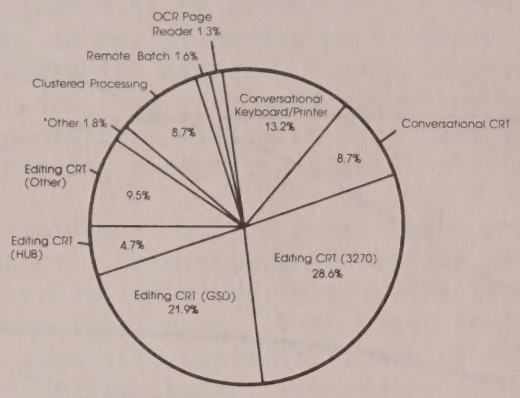
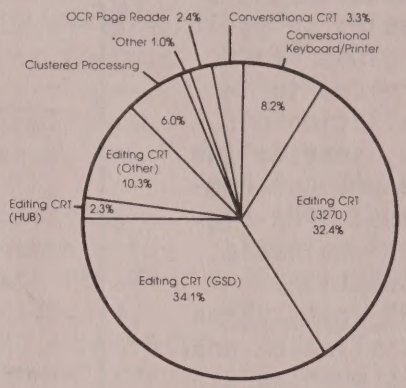


1982
Total $ Value Shipped
$3,365,100,000

*Other

OCR Line Reader .67%
Keypunch .04%
Key-to-Diskette .25%
Key-to-Disk .63%
Editing KSR .22%



1987
Total $ Value Shipped
$4,771,700,000

*Other

Remote Batch .3%
OCR Line Reader .5%
Key-to-Disk .1%
Editing Keyboard/Printer .1%

Terminals, withstanding the threat

Given the booming activity in the desktop market, the terminal market is showing surprising vitality. IDC expects that unit shipments in the U.S. will grow at 20.4% over the 1982-1987 period, but because of falling prices shipment value will rise just 11.5%. Lower prices, the limited requirements of many tasks (such as data entry) and easier links to large computers are three reasons why terminal sales will remain solid.

The terminal market remains highly fragmented. IBM dominates with 30% of 1982 shipments, but shares drop off sharply after that with DEC in second place at 8%, and no one else over 5%. Within the 3270 market, IBM has watched its share steadily erode, but in 1982 it brought out its smaller low-priced 3178 which has squeezed profit margins at PCM terminal makers such as Memorex, Telex, ITT, Raytheon, and Lee Data.

In 1982 IBM recognized the overlap between terminals and PCs by offering a 3270 to PC upgrade package, following similar moves by DEC and Sperry, but EDP/IR thinks that the importance of such offerings is largely symbolic. IBM also brought its large flat panel display to market, and the portable computer market continues to spur attempts to develop flat panel technology.

NOTES TO CENSUSES AND FORECASTS

- Inflation -- The value of computer system shipments shown in the Review and Forecast pages (in red) represents the if-sold, quantity-one price of equipment at the time of sale. All figures are in nominal dollars.

- Value -- The value of shipments and installed base includes peripheral sales based on IDC's Average System Values, shown in the census sections.

- Installed base -- The number in use column accounts for retirements. For the minicomputer and small business figures retirements are done only on an aggregate basis; they are not reflected in the census sections.

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COMPUTER MARKET SUMMARY -- U.S. BASED MANUFACTURERS
(Copyright 1983 -- International Data Corp.)

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1977	164,400	547,300	16,310	89.4
1978	212,000	840,400	20,100	105.3
1979	458,400	1,261,600	23,030	121.5
1980	683,900	1,909,100	26,400	140.5
1981	1,059,100	2,922,300	27,710	154.6
1982	3,530,400	6,411,100	34,440	180.0
1983	6,827,700	13,187,100	42,890	211.5
1984	10,783,600	23,909,900	48,210	243.7
1985	14,371,600	38,208,400	59,240	287.4
1986	18,269,100	56,396,700	70,400	340.9
1987	22,454,000	78,761,900	76,610	397.2
		UNITED STATES		
1977	112,300	355,000	9,070	50.6
1978	126,600	564,900	11,010	59.1
1979	295,600	832,500	12,530	67.6
1980	463,000	1,268,100	15,190	78.6
1981	728,800	1,967,300	16,520	89.5
1982	2,791,400	4,729,700	22,370	106.3
1983	5,256,900	9,951,900	26,200	124.9
1984	8,279,800	18,190,900	30,990	145.8
1985	10,629,300	28,772,800	36,790	175.2
1986	12,890,500	41,610,100	43,520	210.3
1987	15,163,700	56,714,400	48,590	246.4
		INTERNATIONAL		
1977	52,100	192,300	7,240	38.8
1978	85,400	275,500	9,090	46.2
1979	162,800	429,100	10,500	53.9
1980	220,900	641,000	11,210	61.9
1981	330,300	955,000	11,190	65.1
1982	739,000	1,681,400	12,070	73.7
1983	1,570,800	3,235,200	16,690	86.6
1984	2,503,800	5,719,000	17,220	97.9
1985	3,742,300	9,435,600	22,450	112.2
1986	5,378,600	14,786,600	26,880	130.6
1987	7,290,300	22,047,500	28,020	150.8

This computer market summary shows the total of all general purpose computers, minicomputers, small business computers, and desktop computers. Minis used in SBCs are subtracted to avoid double counting.

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GENERAL PURPOSE COMPUTER MARKET -- U.S. BASED MANUFACTURERS*
(Copyright 1983 -- International Data Corporation)

	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1977	17,800	111,500	12,500	77.7
1978	10,800	113,000	14,740	88.6
1979	10,200	105,500	15,710	98.2
1980	19,900	110,300	16,610	108.1
1981	20,900	109,400	15,120	110.3
1982	18,300	115,700	18,630	120.5
1983	16,500	118,400	21,690	131.9
1984	18,000	121,900	19,940	137.4
1985	29,400	133,600	24,600	148.1
1986	29,500	146,900	28,840	162.1
1987	28,600	159,100	27,900	172.0
		UNITED STATES		
1977	8,900	58,200	6,600	42.9
1978	4,300	58,000	7,590	48.4
1979	4,700	53,200	8,020	53.0
1980	9,800	54,700	8,880	58.2
1981	10,400	55,100	8,540	61.6
1982	9,300	57,200	11,780	68.3
1983	8,300	58,500	11,750	73.2
1984	9,600	60,100	11,400	75.6
1985	14,300	65,600	12,920	82.1
1986	14,200	71,500	15,050	90.1
1987	14,100	76,500	15,190	94.3
		INTERNATIONAL		
1977	8,900	53,300	5,900	34.8
1978	6,500	55,000	7,150	40.2
1979	5,500	52,300	7,690	45.2
1980	10,100	55,600	7,730	49.9
1981	10,500	54,300	6,580	48.7
1982	9,000	58,500	6,850	52.2
1983	8,200	59,900	9,940	58.7
1984	8,400	61,800	8,540	61.8
1985	15,100	68,000	11,680	66.0
1986	15,300	75,400	13,790	72.0
1987	14,500	82,600	12,710	77.7

* Sales by international manufacturers with U.S.-based sales offices are counted in U.S. totals, but not international.

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MINICOMPUTER MARKET -- U.S.-BASED MANUFACTURERS*
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1977	83,300	312,700	2,410	7.4
1978	103,100	407,600	3,170	10.4
1979	124,700	518,400	4,010	14.1
1980	151,000	654,100	5,040	18.8
1981	150,700	786,700	6,480	24.8
1982	176,500	941,400	7,550	32.1
1983	185,500	1,098,800	8,560	40.0
1984	209,200	1,274,600	10,060	49.3
1985	238,800	1,474,100	12,330	60.7
1986	270,700	1,699,400	15,300	74.9
1987	306,700	1,956,000	18,410	92.1
		UNITED STATES		
1977	60,800	215,500	1,570	4.8
1978	71,700	277,300	2,000	6.6
1979	82,100	345,500	2,550	8.8
1980	92,100	423,100	3,230	11.8
1981	91,900	499,500	4,080	15.5
1982	114,700	597,000	4,830	20.1
1983	120,600	695,700	5,480	25.1
1984	133,900	804,000	6,340	30.9
1985	150,400	924,700	7,770	38.0
1986	167,800	1,058,500	9,490	46.7
1987	187,100	1,208,700	11,410	57.2
		INTERNATIONAL		
1977	22,500	97,200	840	2.6
1978	31,400	130,300	1,170	3.8
1979	42,600	172,900	1,460	5.3
1980	58,900	231,000	1,810	7.0
1981	58,800	287,200	2,400	9.3
1982	61,800	344,400	2,720	12.0
1983	64,900	403,100	3,080	14.9
1984	75,300	470,600	3,720	18.4
1985	88,400	549,400	4,560	22.7
1986	102,900	640,900	5,810	28.2
1987	119,600	747,300	7,000	34.9

* Sales by international manufacturers with U.S.-based sales offices are counted in U.S. totals, but not international.

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SMALL BUSINESS COMPUTER MARKET -- U.S.-BASED MANUFACTURERS*
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	Number of Systems Shipped	Cumulative Number in Use	$ Million Value Shipped	$ Billion Value in Use
		WORLDWIDE		
1977	33,100	72,100	1,270	2.8
1978	42,900	113,500	1,840	4.6
1979	55,800	164,900	2,610	7.0
1980	65,700	225,800	3,200	10.0
1981	71,100	291,000	3,530	13.4
1982	73,100	355,600	3,480	16.5
1983	75,700	420,200	3,530	19.5
1984	85,100	490,400	3,920	22.8
1985	98,100	569,530	4,380	26.4
1986	111,100	657,700	4,850	30.2
1987	124,100	755,300	5,300	34.3
		UNITED STATES		
1977	20,500	47,500	810	1.9
1978	27,500	73,500	1,160	3.0
1979	30,200	100,000	1,450	4.3
1980	39,300	135,500	2,080	6.2
1981	42,400	173,800	2,100	8.2
1982	41,400	210,000	1,990	9.9
1983	41,500	244,800	1,950	11.6
1984	46,400	282,700	2,180	13.4
1985	54,400	326,400	2,500	15.5
1986	62,500	375,800	2,810	17.7
1987	70,700	430,500	3,110	20.0
		INTERNATIONAL		
1977	12,600	24,600	460	0.9
1978	15,400	40,000	680	1.6
1979	25,600	64,900	1,160	2.7
1980	26,400	90,300	1,120	3.8
1981	28,700	117,200	1,430	5.2
1982	31,700	145,600	1,490	6.6
1983	34,200	175,400	1,580	7.9
1984	38,700	207,700	1,740	9.4
1985	43,700	243,100	1,880	10.9
1986	48,400	281,900	2,040	12.5
1987	53,400	324,800	2,190	14.3

* Sales by international manufacturers with U.S.-based sales offices are included in U.S. totals, but not international.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Computer Census are based on the best information available to IDC but are estimates nevertheless. General-Purpose computers -- as characterized by IBM's System/3, System/38, 370, 4300, 303X, and 308X, and competitors -- are designed for use in a wide variety of applications. They are character or byte oriented and programmed in higher level languages. Many of the General-Purpose computer manufacturers also market smaller systems, also general-purpose in design, which are included in the Small Business Computer and Minicomputer censuses.

Instead of being defined by shifting average purchase or rental values, size classes are based on IBM products and other manufacturers' models that compete with them, e.g., a computer in size class 7 would compete with an IBM 3081. Average purchase and monthly rental values are based on system price including peripherals except for plug-compatible vendors Amdahl, Cambex, Control Data Corporation-Omega, IPL, Magnuson, and National Advanced Systems, where only CPU value is counted. An "X" in the last column means none will be shipped from the original manufacturer, and an "*" means none will be shipped until after 1983.

GENERAL-PURPOSE CENSUS AS OF JANUARY 1, 1983

Name of Manufacturer	Computer Model	Old Size Class	New Size Class	Average Purchase Price ($000)	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Amdahl	470V/5 II	6	L	2,205	09/77	37	32	69	X
	470V/6 II	7	VL	3,260	06/75	126	50	176	X
	470V/7, A, B	7	VL	2,385	09/78	132	102	234	X
	470V/7C	6	L	1,100	02/81	40	22	62	9
	470V/8	7	VL	2,432	09/79	151	94	245	10
	580/5850	7	VL	2,750	2Q/83	0	0	0	50
	580/5860	7	VL	3,150	08/82	13	1	14	100
	580/5870	7	VL	5,200	4Q/83	0	0	0	5
	580/5880	7	VL	6,200	4Q/83	0	0	0	6
	TOTAL					499	301	800	180
Burroughs	2/3/500	3	M	315	11/61	94	44	138	X
	1710	2	M	139	12/75	267	291	558	X
	1720	3	M	350	02/73	196	198	394	X
	1815/25/30	2	M	122	05/77	259	469	728	X
	1855/60/70/85	3	M	254	05/77	981	311	1,292	X
	1905	2	M	99	04/80	238	135	373	30
	1955/85	3	M	195	04/80	1,412	1,070	2,482	500
	2500	4	M	499	02/67	2	5	7	X
	2700	4	M	530	08/72	63	44	107	X
	2800	4	M	442	12/76	195	115	310	X
	2900	4	M	500	07/80	338	191	529	10
	2925	4	M	362	02/83	0	0	0	250
	3500	4	M	910	05/67	125	81	206	X
	3700	4	M	1,230	11/72	127	136	263	X
	3800	4	M	661	04/77	217	49	266	X
	3955	4	M	730	09/81	108	20	128	100
	45/4700	5	L	1,560	10/71	149	70	219	X
	4800	5	L	1,351	09/76	302	105	407	20
	4955	5	L	1,770	3Q/83	0	0	0	70
	55/5700	5	L	1,680	03/63	15	7	22	X
	5920	5	M	420	3Q/82	43	7	50	120
	5930	5	M	543	01/81	50	75	125	40
	65/6700	6	L	3,168	11/69	127	100	227	X
	6800	5	L	1,711	06/77	305	120	425	X
	6900	5	L	2,226	11/80	105	51	156	10
	6925	5	L	947	3Q/82	12	3	15	100
	7700	5	L	6,440	08/73	38	25	63	X
	7800	7	VL	5,062	11/78	129	31	160	10
	7900 F, H, K	7	VL	6,600	3Q/83	0	0	0	50
	TOTAL					5,897	3,753	9,650	1,310
Cambex	1636	4	M	100	10/81	6	0	6	X
	1636-10	4	M	98	1Q/83	0	0	0	10
	1638/40	4	M	118	01/79	5	4	9	X
	1641	4	M	175	10/80	6	15	21	X
	1641-11	4	M	170	2Q/83	0	0	0	6
	1651	5	M	200	2Q/82	5	3	8	X
	1651-11	5	M	245	2Q/83	0	0	0	4
	TOTAL					22	22	44	20
Control Data Corp.	Omega 480-1	4	M	360	06/77	71	1	72	X
	Omega 480-2	5	M	367	08/78	63	3	66	X
	Omega 480-3	5	M	420	01/80	55	2	57	X
	Subtotal					189	6	195	0
	Cyber 170-720	5	L	1,525	05/79	80	115	195	5
	Cyber 170-730	6	L	2,247	06/79	75	35	110	5
	Cyber 170-740	6	L	3,041	04/80	10	5	15	5
	Cyber 170-750	6	VL	4,514	08/79	30	15	45	5
	Cyber 170-760	7	L	5,767	04/79	40	8	48	5
	Cyber 71	4	M	977	07/76	1	3	4	X
	Cyber 171	4	M	1,111	08/77	13	39	52	X
	Cyber 72	5	L	1,810	10/71	6	17	23	X
	Cyber 172	6	L	2,006	07/75	15	40	55	X
	Cyber 73	6	L	2,630	03/72	22	28	50	X
	Cyber 173	6	L	3,333	09/75	8	19	27	X
	Cyber 74	7	VL	5,000	03/72	25	12	37	X
	Cyber 174	6	L	4,178	09/75	13	13	26	X
	Cyber 175	7	VL	6,165	08/75	31	23	54	X
	Cyber 76	7	VL	7,905	03/72	8	9	17	X
	Cyber 176	7	VL	7,550	01/78	17	3	20	X
	Cyber 203	7	VL	9,961	11/80	4	-	4	2
	Cyber 205	7	VL	11,010	01/81	6	3	9	5
	Cyber 170-825	4	M	890	03/82	20	15	35	60
	Cyber 170-835	5	L	1,820	03/82	12	18	30	50
	Cyber 170-855	6	L	3,790	11/82	2	3	5	30
	Cyber 170-865	7	VL	4,650	3Q/83	0	0	0	10
	Cyber 170-875	7	VL	6,095	3Q/82	0	0	0	7
	Cyber 170-875 dual	7	VL	8,640	3Q/83	0	0	0	3
	Subtotal					438	423	861	192
	G-20	4	M	830	04/61	1	-	1	X
	1604	6	L	1,750	01/60	5	-	5	X
	31/3150	4	M	419	12/64	20	10	30	X
	3170	5	L	970	12/70	8	4	12	X
	3200	4	M	625	05/64	13	10	23	X
	3300	5	L	1,491	09/65	68	23	91	X
	3400	5	L	1,019	11/64	2	-	2	X
	3500	5	L	1,341	01/69	24	12	36	X
	3600	6	L	2,107	06/63	5	3	8	X
	3800	6	L	2,568	12/65	12	-	12	X
	6200	6	L	1,825	11/70	-	-	-	X
	6400	6	L	2,723	05/66	30	9	39	X
	6500	6	L	3,700	12/67	12	10	22	X
	6600	7	VL	4,990	08/64	37	13	50	X

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Name of Manufacturer	Computer Model	Old Size Class	New Size Class	Average Purchase Price ($000)	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Control Data Corp. (Continued)	6700	7	VL	6,005	07/70	2	-	2	X
	7600	7	VL	8,200	01/69	24	3	27	X
	Star 100	7	VL	12,000	12/74	-	-	-	X
	Subtotal					263	97	360	0
	TOTAL					890	526	1,416	192
Cray	1A, 1B	7	VL	8,290	04/76	10	7	17	X
	1S	7	VL	8,200	11/80	26	5	31	6
	XMP 22	7	VL	9,000	3Q/83	0	0	0	4
	XMP 24	7	VL	11,000	3Q/83	0	0	0	
	M	7	VL	5,000	3Q/83	0	0	0	4
	TOTAL					36	12	48	14
Denelcor	HEP	6	L	1,400	02/82	5	1	6	7
Digital Equipment Corporation	2020	3	M	312	07/78	210	181	391	18
	2040/50	4	M	709	06/76	101	35	136	X
	2060	5	M	970	07/79	225	116	341	55
	PDP-6	4	M	400	10/64	1	0	1	X
	1040/50	4	M	693	10/67	44	20	64	X
	1060/70	5	M	860	06/72	77	38	115	X
	1080/90	6	L	1,358	06/75	340	199	539	170
	TOTAL					998	589	1,587	243
HIS	DPS 8/20	4	M	528	04/80	86	30	116	5
	DPS 8/44	4	M	827	01/80	93	68	161	5
	DPS 8/52	5	L	1,910	11/80	35	32	67	20
	DPS 8/62	5	L	2,253	12/81	8	1	9	5
	DPS 8/70	6	L	3,580	05/80	86	70	156	50
	DPS 88/81	7	VL	5,940	3Q/83	0	0	0	25
	DPS 88/82	7	VL	8,440	3Q/83	0	0	0	5
	Subtotal					308	201	509	115
	H 61/40	2	M	97	06/76	-	1,900	1,900	X
	H-61/58	2	M	108	06/74	40	613	653	X
	H-61/60	2	M	155	06/74	20	2,300	2,320	X
	H-Level 62	3	M	237	10/74	780	2,360	3,140	10
	DPS 4	3	M	82	07/80	-	2,305	2,305	700
	64/300	4	M	387	04/79	117	1,057	1,174	X
	H Level 64	4	M	568	10/74	214	980	1,194	X
	H-66/05/07	4	M	863	10/76	55	125	180	X
	H-66/10/17	5	L	1,411	06/75	30	81	111	X
	H-66/20/27	5	L	1,900	11/74	70	138	208	X
	H-66/40/60	6	L	3,678	10/74	85	156	241	X
	H-66/440/520	5	M	874	12/79	90	44	134	X
	H-66 DPS, BC	6	L	3,527	07/78	125	197	322	5
	H-66/80	7	VL	5,746	10/74	19	54	73	X
	H-68/80	7	VL	4,918	10/74	20	2	22	X
	H-68/DPS	7	VL	5,843	09/78	26	12	38	X
	Comshare/Xerox	5	M	612	06/79	18	0	18	X
	DPS7	4	M	480	--/81	50	271	321	300
	DPS 847	4	M	500	03/83	0	0	0	50
	DPS 849	4	M	800	03/83	0	0	0	30
	Subtotal					1,759	12,595	14,354	1,095
	G-50	2	M	82	08/70	65	900	965	X
	G-100	3	M	215	04/66	41	550	591	X
	G-200	4	M	425	04/61	32	10	42	X
	G-400	4	M	700	05/64	62	63	125	X
	G-600	6	L	3,400	04/65	12	10	22	X
	G-6023/25	5	L	1,490	11/73	11	15	26	X
	G-6030/40	5	L	1,900	06/71	14	72	86	X
	G-6050/60	6	L	3,250	07/71	37	47	84	X
	G-6070/80	6	L	4,890	07/71	18	28	46	X
	G-6180	7	VL	4,826	02/74	3	-	3	X
	Gamma-10	2	M	108	07/64	-	215	215	X
	Gamma-30	4	M	437	02/62	-	0	0	X
	Subtotal					295	1,910	2,205	0
	H 105/115	3	M	280	03/70	49	75	124	X
	H 110/120/200	3	M	285	01/66	98	74	172	X
	H-125	4	M	365	12/67	6	35	41	X
	H-2020/30	3	M	190	01/73	145	50	195	X
	H-1015/2015	4	M	805	02/71	14	12	26	X
	H-1200	4	M	629	02/66	75	24	99	X
	H-2040	4	M	595	04/72	50	38	88	X
	H-2050/60	4	M	920	04/72	80	52	132	X
	H-2200	4	M	862	01/66	33	9	42	X
	H-2070	5	L	1,600	05/72	15	1	16	X
	H-3200	5	L	1,220	02/70	35	18	53	X
	H-4200	5	L	1,920	09/68	3	1	4	X
	H-8200	6	L	2,950	02/69	5	4	9	X
	H-4/1400	4	M	560	12/61	5	4	9	X
	H-8/1800	5	L	1,500	12/60	3	1	4	X
	Subtotal					616	398	1,014	0
	TOTAL					2,978	15,104	18,082	1,210
IBM	System/38-3	2	M	140	07/80	830	740	1,570	X
	System/38-4	3	M	150	08/81	3,945	2,990	6,935	3,000
	System/38-5	3	M	280	07/80	815	730	1,545	
	System/38-7	4	M	380	06/82	150	150	300	
	System/38-8	4	M	400	07/83	0	0	0	
	Subtotal					5,740	4,610	10,350	3,000
	System/3-4	2	M	58	06/76	60	30	90	X
	System/3-6	2	M	75	12/70	290	74	364	X
	System/3-8	2	M	100	06/75	600	800	1,400	X
	System/3-10	2	M	115	01/70	2,565	854	3,419	X
	System/3-12	3	M	173	03/76	1,135	1,150	2,285	X
	System/3-15	3	M	320	03/74	2,445	1,227	3,672	X
	Subtotal					7,095	4,135	11,230	0
	4321	3	M	215	03/82	4,810	3,590	8,400	780
	4331-1	3	M	301	04/79				
	4331-11	4	M	370	03/82	1,450	1,170	2,620	900
	4331-2	4	M	573	08/80				

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Name of Manufacturer	Computer Model	Old Size Class	New Size Class	Average Purchase Price ($000)	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
IBM (Continued)	4341-9	4	M	210	02/83	0	0	0	1,550
	4341-10	4	M	445	03/82	580	610	1,190	
	4341-1	4	M	883	10/79	4,550	4,365	8,915	
	4341-11	5	M	810	03/82	2,140	1,650	3,790	2,320
	4341-2	5	M	1,156	03/81				
	4341-12	5	M	1,050	02/83				
	Subtotal					13,530	11,385	24,915	5,550
	3031	6	L	2,440	03/78	840	1,016	1,856	X
	3032	6	L	4,130	03/78	205	440	645	X
	3033S	6	L	3,380	01/81	145	85	230	X
	3033N	7	VL	3,856	01/80	300	380	680	X
	3033UAM	7	VL	7,290	03/78	970	635	1,605	X
	Subtotal					2,460	2,556	5,016	0
	3083E	6	L	3,200	2Q/83	0	0	0	1,400
	3083B	6	L	4,800	1Q/83	0	0	0	
	3083J	6	L	6,000	1Q/83	0	0	0	
	3081D	7	VL	7,300	10/81	600	224	824	1,000
	3081G	7	VL	6,900	09/82	90	26	116	
	3081K	7	VL	7,900	05/82	270	90	360	
	3084	7	VL	14,360	1Q/84	0	0	0	*
	Subtotal					960	340	1,300	2,400
	370/115	3	M	450	04/74	185	820	1,005	X
	370/125	4	M	620	06/73	210	557	767	X
	370/135	4	M	960	05/72	390	400	790	X
	370/138	4	M	935	11/76	790	1,300	2,090	X
	370/145	5	L	1,790	07/71	355	340	695	X
	370/148	5	L	1,595	03/77	880	850	1,730	X
	370/155	6	L	3,250	02/71	175	52	227	X
	370/158	6	L	5,025	05/73	1,095	764	1,859	X
	370/165	7	VL	6,100	06/71	35	6	41	X
	370/168	7	VL	9,050	07/73	500	190	690	X
	370/195	7	VL	12,450	03/71	7	3	10	X
	Subtotal					4,622	5,282	9,904	0
	360/20	3	M	136	12/65	365	152	517	X
	360/22	3	M	174	07/71	15	19	34	X
	360/25	3	M	391	10/68	20	81	101	X
	360/30	4	M	528	06/65	415	150	565	X
	360/44	4	M	880	07/66	25	14	39	X
	360/40	4	M	895	06/65	420	145	565	X
	360/50	5	L	1,550	08/65	190	68	258	X
	360/65	6	L	3,250	11/65	120	28	148	X
	360/67	7	VL	6,020	06/66	20	6	26	X
	360/75	7	VL		01/66				X
	360/85	7	VL		10/69				X
	360/9X	7	VL	9,150	11/67	1	1	2	X
	Subtotal					1,591	664	2,255	0
	1130	2	M	120	02/66	560	300	860	X
	1401	3	M	178	09/60	227	30	257	X
	1401G-H	2	M	106	05/64	6	1	7	X
	1410	4	M	800	11/61	4	1	5	X
	1440	3	M	227	04/63	12	5	17	X
	1460	4	M	460	10/63	5	1	6	X
	1620	3	M	129	09/60	20	11	31	X
	7010	5	L	1,200	10/63	2	1	3	X
	7030	7	L	-	05/61	-	-	-	X
	7040/44	5	L	1,439	06/63	1	1	2	X
	7070/74	5	L	1,299	03/60	7	-	7	X
	7080	6	L	2,800	08/61	4	-	4	X
	7090/94	6	L	3,350	08/60	6	-	6	X
	Subtotal					854	351	1,205	0
	TOTAL					36,852	29,323	66,175	10,950
IPL	4436	4	M	165	11/80	28	11	39	2
	4443	4	M	209	03/80	66	63	129	3
	4445	4	M	228	12/82	2	0	2	30
	4446	4	M	294	12/81	35	11	46	20
	4460	5	L	375	3Q/83	0	0	0	10
	4480	5	L	579	1Q/83	0	0	0	30
	TOTAL					131	85	216	95
Magnuson	M80/3	4	M	195	01/79	17	1	18	X
	M80/4	5	M	310	12/78	33	4	37	X
	M80/20	3	M	59	10/82	5	0	5	2
	M80/30	4	M	89	08/81	23	0	23	2
	M80/30E	4	M	112	12/81	1	0	1	X
	M80/31	4	M	134	06/80	74	7	81	8
	M80/32	4	M	176	06/80	119	12	131	8
	M80/41	4	M	163	02/82	2	0	2	1
	M80/42	4	M	183	03/81	69	7	76	7
	M80/43	5	M	238	03/81	61	6	67	8
	TOTAL					404	37	441	36
National Advanced Systems	AS/3	4	M	612	11/78	25	31	56	X
	AS/4	5	M	918	06/77	19	9	28	X
	AS/5	6	L	1,520	03/77	111	81	192	X
	AS/7020/30	5	M	820	01/79	-	9	9	X
	AS/7031	6	L	1,297	12/78	42	28	70	X
	AS/6	6	L	2,386	12/78	47	37	84	X
	AS/3000	4	M	460	01/80	39	14	53	X
	AS/5000	5	M	596	02/80	86	58	144	X
	AS/6600	5	M	465	10/82	3	5	8	120
	AS/7000	6	L	1,643	04/80	52	44	96	5
	AS/9000	7	VL	4,299	12/80	21	15	36	70
	AS/9040	7	VL	2,000	10/82	2	-	2	
	AS/9050	7	VL	2,570	10/82	2	0	2	
	AS/9060	7	VL	3,550	08/82	20	8	28	
	AS/9070	7	VL	4,150	12/82	1	-	1	
	AS/9080	7	VL	5,250	12/82	1	-	1	
	TOTAL					471	339	810	195
NCR	8270	2	M	87	11/79	434	660	1,094	20
	8350	2	M	154	07/77	72	5	77	X
	8370	3	M	269	07/78	9	-	9	X
	8410	2	M	150	02/79	189	259	448	X

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Name of Manufacturer	Computer Model	Old Size Class	New Size Class	Average Purchase Price ($000)	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
NCR (Continued)	8430	3	M	248	06/78	75	245	320	X
	8450	3	M	362	11/77	145	150	295	X
	8455	3	M	258	04/79	177	310	487	40
	8535II	3	M	220	04/82	10	18	28	70
	8545II	3	M	315	04/82	10	19	29	60
	8550	3	M	594	04/76	168	121	289	X
	8555	3	M	415	04/79	270	260	530	X
	8555II	3	M	400	04/82	68	80	148	240
	8560	4	M	699	11/77	40	25	65	X
	8565	4	M	549	04/79	95	156	251	X
	8565 II	4	M	440	04/82	20	25	45	80
	8570	4	M	894	05/76	88	81	169	X
	8575	4	M	684	04/79	99	73	172	X
	8580	5	L	1,627	12/78	5	10	15	X
	8585	5	L	1,381	08/79	31	53	84	X
	8650	6	L	1,000	11/81	0	15	15	X
	8670	6	L	1,300	05/82	0	7	7	X
	8575 II	5	M	514	05/82	10	12	22	60
	8585 II	5	M	549	05/82	5	6	11	30
	8595 II	5	M	696	05/82	5	6	11	25
	Subtotal					2,025	2,596	4,621	625
	8635	4	M	900	Q4/83	0	0	0	
	8645	5	L	1,420	Q4/83	0	0	0	
	8655	5	L	1,775	Q4/83	0	0	0	40
	8665	6	L	2,200	Q4/83	0	0	0	
	8675	6	L	2,660	Q4/83	0	0	0	
	8685	6	L	3,990	Q4/83	0	0	0	
	8695	6	L	4,990	Q4/83	0	0	0	
	Subtotal					0	0	0	40
	Century 50	2	M	80	02/71	120	133	253	X
	Century 75	2	M	114	07/76	25	36	61	X
	Century 100	3	M	157	09/68	90	80	170	X
	Century 101	3	M	201	10/72	270	350	620	X
	Century 151	3	M	289	02/75	103	122	225	X
	Century 200	4	M	367	09/69	60	60	120	X
	Century 201	4	M	590	09/69	77	85	162	X
	Century 251	4	M	1,005	11/73	14	18	32	X
	Century 300	5	L	1,340	02/72	45	51	96	X
	315/315/100	3	M	164	05/62	0	2	2	X
	315-RMC	4	M	500	09/65	0	1	1	X
	Subtotal					804	938	1,742	0
	TOTAL					2,829	3,534	6,363	665
Singer	System 10	2	M	120	10/70	764	0	764	X
Sperry Univac	III	4	M	1,124	08/62	45	8	53	X
	SS80/90	3	M	355	08/58	-	-	-	X
	418 I, II	4	M	450	06/63	28	27	55	X
	418 III	4	L	1,700	06/69	44	90	134	X
	491/492	5	M	1,150	12/61	1	3	4	X
	494	6	L	3,200	02/66	60	40	100	X
	1004	2	S	46	02/63	90	43	133	X
	1005	2	M	85	04/66	58	3	61	X
	1050	3	M	380	09/63	30	8	38	X
	Subtotal					356	222	578	0
	9200	2	M	98	06/67	536	310	846	X
	9300	3	M	212	09/67	439	260	699	X
	9400/80	4	M	530	05/69	125	260	385	X
	90/25	3	M	187	08/77	45	80	125	X
	90/30	3	M	402	02/75	755	1,310	2,065	X
	90/40	4	M	718	06/78	120	160	280	X
	90/60	4	L	1,111	01/74	115	132	247	X
	90/70/9700	5	L	1,275	08/72	5	18	23	X
	90/80	5	L	3,053	12/76	89	53	142	X
	System/80-3-4	2	M	136	12/80	487	670	1,157	200
	System/80-5-6	3	M	203	12/82	15	10	25	200
	System/80-8	3	M	413	--/83	0	0	0	40
	Subtotal					2,731	3,263	5,994	440
	1106	6	L	1,920	12/69	33	120	153	X
	1107	6	L	2,525	10/62	1	2	3	X
	1108	7	VL	3,750	09/65	140	53	193	X
	1110	7	L	6,250	06/72	18	42	60	X
	1100/10	5	L	1,965	04/76	75	143	218	X
	1100/20	5	L	2,674	04/75	6	18	24	X
	1100/40	6	L	4,493	07/75	37	33	70	X
	1100/60	5	L	1,821	03/80	310	720	1,030	470
	1100/80/81/82	6	L	5,447	03/77	180	158	338	15
	1100/83	7	VL	8,732	07/78	18	21	39	2
	1100/84	7	VL	10,300	11/78	41	21	62	5
	1100/91	6	L	6,367	1Q/84	-	-	-	*
	1100/92	6	L	10,631	1Q/84	-	-	-	*
	1100/93	7	VL	15,804	1Q/84	-	-	-	*
	1100/94	7	VL	17,980	1Q/84	-	-	-	*
	Subtotal					859	1,331	2,190	492
	301	4	M	295	10/60	4	-	4	X
	501	5	M	695	06/59	-	-	-	X
	3301	5	M	1,021	06/64	13	-	13	X
	Spectra 70/15	3	M	203	09/65	-	-	-	X
	Spectra 70/25	3	M	343	09/65	-	1	1	X
	Spectra 70/35	4	M	634	01/67	18	3	21	X
	Spectra 70/45	5	L	1,181	11/65	51	1	52	X
	Spectra 70/46	5	L	1,963	11/68	1	-	1	X
	Spectra 70/55	5	L	1,800	11/68	-	-	-	X
	Spectra 70/60	6	L	2,245	09/70	6	-	6	X
	Spectra 70/61	6	L	2,350	03/71	2	1	3	X
	Spectra 1600	3	M	180	01/69	13	-	13	X
	Spectra 70/2	4	M	620	07/71	3	-	3	X
	Spectra 70/3	4	M	1,040	10/71	5	-	5	X
	Spectra 70/6	6	L	1,680	10/71	17	-	17	X
	Spectra 70/7	6	L	2,140	10/71	12	2	14	X
	Subtotal					145	8	153	0
	TOTAL					4,091	4,824	8,915	932
Xerox	Sigma 5	4	M	585	08/67	66	7	73	X
	Sigma 6	4	M	1,030	11/70	18	12	30	X
	Sigma 7	5	L	1,170	12/66	25	4	29	X
	Sigma 8	4	M	920	09/71	0	1	1	X
	Sigma 9	6	L	2,400	11/71	70	27	97	X
	530	3	M	180	08/73	71	8	79	X
	550/560	4	M	631	11/74	21	2	23	X
	940	5	M	1,050	04/66	33	0	33	X
	9300	3	M	340	11/64	9	2	11	X
	TOTAL					313	63	376	X
GRAND TOTAL						57,180	58,513	115,693	

+++ The code to IDC's new classification: VL -- Very Large Scale System; L -- Large Scale System; M -- Medium Scale System; S -- Small Scale System.

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MINICOMPUTER CENSUS

IDC categorizes computers as "minicomputers" based primarily on the perceived marketplace for these products. By definition, minis are general-purpose in design, but are sold as tools as well as solutions; are available from makers in configurations ranging from board only to complete systems; are available to OEMs and are usually discounted in volume buys; are part of a family with low-end products generally in the $1,000-$25,000 price range; and have at least 4K RAM. Minicomputers range in size class from Microminis (M), which compete with high-end Microcomputers, to Traditional Minis (T), to Superminis (S), which frequently compete with small General-Purpose computers in interactive commercial applications. This census counts "Cumulative Number Shipped," making no attempt for retirements.

MINICOMPUTER CENSUS AS OF JANUARY 1, 1983

Name of Manufacturer	Computer Model	Word Length	Old Size Class	New Size Class	Notes	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Able Computer*	34 Magnum	16	T	S		21	14	10/81	10	0	10	X
	44 Magnum	16	S	S		21	16	07/81	40	10	50	X
								TOTAL	50	10	60	
Ampex	BMS/86, Different Series	16	T	S		7	12	06/78	1,900	1,400	3,300	NA
Apollo Computer	DN400	32	S	S		30	30	03/81	165	59	224	1,000
	DN420	32	S	S		33	32	03/81	216	71	287	1,000
	DN600	32	S	M		59	75	08/82	51	12	63	1,000
	DN300	32	S	S		13	20	02/83	0	0	0	1,000
								TOTAL	432	142	574	
Artonix*	PC-12/7	12	T	S		20	45	09/71	135	40	175	X
August Systems	Series 300	16	S	M		85	125	11/81	7	2	9	20
Auragen	4000	68000	S	M		138	138	4Q/82	0	0	0	NA
BTI	4000/15	16	T	S		30	35	01/76	341	8	349	X
	4000/25	16	T	S		42	49	01/76	251	12	263	X
	5000	16	S	S		30	39	09/78	3,500	123	3,623	350
	5000/ES	16	S	S		29	35	07/79	74	0	74	5
	8000	32	S	M		107	175	05/81	36	8	44	80
								TOTAL	4,202	151	4,353	
Bytronix	Series 500	16	T	S		3	4	09/80	170	280	450	NA
	Series 1000	16	T	S		5	5	12/77	200	600	800	NA
	Series 2000	16	T	S		8	8	12/78	75	115	190	X
	Series 3000	16	T	S		7	8	12/78	85	445	530	X
	Series 4000	16	T	S		7	5	03/81	150	300	450	NA
	Series 5000	16	T	S		10	7	09/81	30	15	45	NA
	Series 550	16	T	S		4	5	01/82	25	100	125	50
	Mikron 600 Series	16	T	S		5	7	10/82	75	25	100	750
								TOTAL	810	1,880	2,690	
Century Computer Corp.	C-200	M	T	S		5	7	02/71	150	0	150	X
Charles River Data	Universe 68/15	32	S	S		19	15	02/82	25	8	33	X
	Universe 68/17	32	S	S		21	19	04/82				
	Universe 68/27	32	S	S		17	14	08/82				
	Universe 68/37	32	S	S		18	15	08/82	10	3	13	NA
	Universe 68/47	32	S	S		22	18	08/82	5	2	7	NA
	Universe 68/80	32	S	S		39	31	1Q/81	10	0	10	NA
	Universe 68/05	32	S	S		12	12	12/82	2	0	2	NA
								TOTAL	52	13	65	
Cincinnati Milacron*	CIP/2000 Series	8, 10	T	S		4	17	07/69	4,676	804	5,480	X
	CIP/4000 Series	8, 10	T	S		4	17	12/76				
								TOTAL				
Compiler Systems Inc.*	CSI-16	16	T	S		11	20	11/70	80	10	90	X
	CSI-24	24	T	S		15	30	12/70	35	5	40	X
								TOTAL	115	15	130	
Computer Automation	108, 208, 808	M	T	S		5	11	04/68	280	30	310	X
	116	16	T	S		8	16	08/70	200	50	250	X
	216	16	T	S		8	20	07/69	350	45	395	X
	816	16	T	S		10	15	12/68	40	5	45	X
	Alpha-8, Naked Mini-8	M	T	S		2	3	05/72	5,002	1,340	6,342	X
	Alpha-16, Naked Mini 16	16	T	S		3	8	10/71				
	LSI 2/10, 20, 60	16	T	S		2	5	12/73	22,920	3,026	25,946	1,000
	LSI 2/40	16	T	S		8	18	04/80	300	200	500	1,000
	LSI 3/05	16	M	S		1	2	02/76	2,352	688	3,040	X
	LSI 4/10	16	M	S		1	8	06/77	8,000	3,934	11,934	NA
	LSI 4/30	16	T	S		2	8	06/77	2,404	656	3,060	1,000
	LSI 4/90	16	S	S		4	9	06/77	913	412	1,325	250
	LSI 4/95	16	S	S		10	24	01/80	129	32	161	150
	Scout N M 4/04	16	M	S		1	2	01/80	500	500	1,000	140
	Omnix	16	T	S		5	11	06/82	125	125	250	2,000
	NM 4/85	16	T	S		6	16	06/82	20	5	25	50
	NM 4/12	16	M	S		2	7	02/83	0	0	0	3,000
								TOTAL	43,535	11,048	54,583	
Computer Talk	CT-400	16	S	S		32	45	09/75	15	0	15	6
	CT-407	16	S	S		41	45	12/77	5	0	5	6
								TOTAL	20	0	20	
Control Data Corp.	1700/System 17/ Cyber 18	16+2	T	S		14	50	03/66	2,229	1,465	3,694	176
	Elbit-100	12	T	S		6	8	06/77	5	445	450	X
								TOTAL	2,234	1,910	4,144	
Data General	MP 100, 200	16	M	S		1	3	05/79	3,095	905	4,000	500
	Micronova	16	M	S		2	4	11/79	9,545	3,975	13,520	1,500
	Nova	16	T	S		6	12	02/69	800	400	1,200	X
	Nova 2 Series	16	T	S		3	10	10/73	7,280	2,720	10,000	X
	Nova 3/4	16	T	S		4	10	01/76	3,355	1,095	4,450	150
	Nova 3/12	16	T	S		5	18	01/76	15,570	5,030	20,600	700
	Nova 3/D	16	T	S		12	36	10/76	2,320	2,130	4,450	150
	Nova 4/C, S, X	16	T	S		3	20	03/79	12,100	7,900	20,000	5,000
	Nova 800/820	16	T	S		7	40	03/71	1,620	580	2,200	X
	Nova 830/840	16	S	S		16	44	01/73	520	280	800	X
	Nova 1200 Series	16	T	S		3	11	12/70	10,870	4,130	15,000	X
	Supernova SC	16	T	S		9	27	04/70	140	60	200	X
	Eclipse S100, 130 140	16	S	S		11	30	02/75	4,950	2,550	7,500	NA

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Data General (continued)	Eclipse AP/130	16	S	S		30	50	09/78				
	Eclipse S200, 230	16	S	S		15	55	02/75	4,040	1,380	5,420	300
	Eclipse S/250	16	S	M		35	150	11/78	435	245	680	300
	Eclipse C/150	16	S	S		55	120	12/78	440	260	700	NA
	Eclipse C/300, 330	16	S	M		24	150	02/75	800	200	1,000	X
	Eclipse C/350	16	S	M		130	180	11/78	600	200	800	100
	Eclipse M/600	16	S	M		164	215	05/78	285	95	380	X
	Eclipse MV/6000	32	S	M		120	200	02/82	295	125	420	420
	Eclipse MV/8000	32	S	M		153	300	10/80	400	220	620	320
	Eclipse MV/4000	32	S	M		28	70	12/82	8	2	10	NA
	Eclipse MV/10000	32	S	M		240	510	2Q/83	0	0	0	NA
	DCC-112	12	T	S	a	3	12	08/70	900	500	1,400	X
	DCC-116	16	T	S	a	5	10	11/71	9,600	1,700	11,300	X
	DCC-416/616	16	T	S	a	3	7	09/75	180	20	200	X
	DCC-Model 5	16	T	S	a	3	6	02/76	90	10	100	X
								TOTAL	90,238	36,712	126,950	
Datamate Computer Systems*	DM-16	16	T	S		17	26	11/69	12	0	12	X
	DM-70	16	T	S		9	15	12/70	25	0	25	X
	ECP-18	18	T	S		14	16	11/66	21	0	21	X
								TOTAL	58	0	58	
Datum*	Enchancer E 1/16	16	T	S		8	15	03/76	15	3	18	X
Digiac Corp.*	3060		T	S		9	13	01/70	70	20	90	X
	3080	25	T	S		20	25	12/64	14	2	16	X
								TOTAL	84	22	106	
Digital Equipment	PDP-8/a, e, f, m	12	T	S		4	15	04/71	45,120	22,930	68,050	X
	PDP-8/1, 1, s	12	T	S		8	27	05/65	5,765	3,685	9,450	X
	PDP-8/e (board level	12	MM	S		4	4	01/82	7,000	3,000	10,000	X
	PDP-9, 9L	18	T	S		35	50	12/66	290	160	450	X
	PDP-11/03, LSI-11/03	16	M	S		2	3	06/75	130,170	81,680	211,850	NA
	PDP-11/23, LSI-11/23	16	M	S		2	6	--/79				
	PDP-11/04, 05, 10, 15, 20	16	T	S		5	17	03/70	31,903	17,847	49,750	NA
	PDP-11/24	16	T	S		14	37	10/81	3,066	2,724	5,790	NA
	PDP-11/34, 35, 40	16	T	S		9	40	01/73	32,205	23,850	56,055	NA
	PDP-11/44	16	S	S		23	60	--/80	8,455	5,040	13,495	NA
	PDP-11/45, 50, 55	16	S	M		24	91	04/72	4,550	1,460	6,010	X
	PDP-11/60	16	S	M		26	75	06/77	1,172	1,078	2,250	NA
	PDP-11/70	16	S	M		60	175	07/75	8,055	3,545	11,600	NA
	VAX-11/730	32	S	M		47	65	06/82	350	300	650	NA
	VAX-11/750	32	S	M		47	100	--/80	2,195	1,645	3,840	NA
	VAX-11/780	32	S	M		128	305	05/78	3,815	2,535	6,350	NA
	VAX-11/782	32	S	M		395	500	2Q/82	35	25	60	NA
	PDP-12	12	T	S		13	46	04/69	510	225	735	X
	PDP-15 XVM	18	T	M		15	82	02/70	550	320	870	X
								TOTAL	278,206	169,049	447,255	
Digital Microsystems*	HEX-29	16	S	S		13	22	04/79	20	20	40	X
Digital Scientific Corp.	Meta-4/4000	16	S	M		29	90	04/70	140	15	155	X
	Meta-4/5010	16	S	S		21	40	10/78	5	0	5	X
	Meta 4/5020	16	T	M		28	85	04/78	48	0	48	4
	Meta 4/5030	16	S	M		59	150	06/79	15	1	16	10
								TOTAL	208	16	224	
Electronic Associates, Inc.	Pacer-100	16	T	S		15	40	05/72	198	161	359	NA
Formation	F/4000	32	S	M		71	134	08/81	35	20	55	25
Forward Technology	Gateway 300	68000	S	S		25	44	04/82	45	5	50	NA
	Gateway 500	68000	S	S		22	38	12/82	2	0	2	NA
								TOTAL	47	5	52	
Foto-Mem, Inc.*	Contour-100	M	T	S		6	20	04/70	25	0	25	X
Four-Phase Systems	Two Pi V/32	32	S	M		125	125	06/78	100	6	106	X
	System 311	32	S	M		160	265	02/81	155	15	170	NA
	System 312	32	S	M		210	320	12/81	52	8	60	NA
								TOTAL	307	29	336	
General Automation	18/30	16	S	S		18	50	07/69	780	210	990	X
	SPC-12	M	T	S		4	16	01/68	3,250	860	4,110	X
	SPC-16	16	T	S		5	25	05/70	7,540	2,125	9,665	X
	16/110, 220	16	M	S		1	7	12/75	8,100	2,710	10,810	NA
	16/230, 240	16	M	S		7	9	05/80				
	16/330, 340	16	T	S		3	10	01/76	405	140	545	X
	16/440, 460	16	S	S		12	30	07/75	2,070	625	2,695	X
	16/550	16	S	S		25	50	03/78	9	2	11	X
	470, 480	16	S	S		16	21	08/80	505	235	740	NA
	900	16	S	S		8	20	04/82	200	100	300	NA
	Zebra	68000	S	S		14	30	04/83	0	0	0	NA
								TOTAL	22,859	7,007	29,866	
GRI Computer*	909 Series	16	T	S		4	9	01/70	320	150	470	X
	99/10, 18	16	T	S		3	5	06/72	24	0	24	X
	99/30, 38	16	T	S		5	15	06/72	578	268	846	X
	99/40, 48	16	T	S		6	17	06/72	207	278	485	X
	99/50, 58	16	T	S		6	12	--/74	146	0	146	X
	99/52	16	T	S		8	17	--/76	7	3	10	X
								TOTAL	1,282	699	1,981	
GT&E*	IS/I	16	T	S		14	36	01/70	160	0	160	X
	IS/1000	16	T	S		6	10	06/72	4,000	0	4,000	X
								TOTAL	4,160	0	4,160	
Harris	6024/3	24	S	M		49	90	02/70	118	1	119	X
	Slash 4	24	S	M		24	110	08/73	243	18	261	X
	Slash 5	24	S	S		16	50	05/72	766	6	772	X
	Slash 6	24	S	M		20	70	12/76	323	10	333	X
	Slash 7	24	S	M		45	180	10/75	18	1	19	X
	Series 100	24	S	M		85	190	10/75	37	1	38	X
	Series 200	24	S	M		179	240	10/75	52	3	55	X
	Series 1X5	24	S	M		85	175	09/77	117	19	136	X
	Series 5X0	24	S	M		195	300	12/78	89	9	98	X
	H80	24	S	M		45	100	02/81	65	25	90	NA
	H100	24	S	M		45	150	01/71	166	14	180	NA
	H300	24/48	S	M		105	200	09/81	66	14	80	NA
	H500	24/48	S	M		100	250	01/79	265	70	335	NA
	H800	24/48	S	M		170	275	03/80	240	35	275	NA
	H800-2B	24/48	S	M		139	0	03/83	0	0	0	NA
	H800-2BP	24/48	S	M		164	0	03/83	0	0	0	NA
	H700	24/48	S	M		50	175	03/83	0	0	0	15
								TOTAL	2,565	226	2,791	

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Hewlett-Packard	2100A	16	T	S		7	15	06/71	7,900	3,400	11,300	X
	2100S	16	T	S		16	36	08/73	1,825	1,425	3,250	X
	2114/15/16	16	T	S		9	29	11/66	2,495	1,145	3,640	X
	1000-M (MX-M, K)	16	T	S		2	25	06/74	8,336	6,507	14,843	NA
	1000-E (MX-E)	16	T	S		14	40	01/77	11,263	11,237	22,500	3,500
	1000-F	16	T	S		18	55	09/78	5,061	3,626	8,687	2,500
	1000-L, XL	16	T	S		2	10	06/79	1,320	1,130	2,450	NA
	1000-A (600, 700 900)	16	T	M		2	40	02/82	2,000	2,000	4,000	20,000
	3000 I, II	16	S	M		100	200	11/72	1,420	880	2,300	X
	3000 III	16	S	M		92	200	06/78	2,309	989	3,298	NA
	3000-33	16	S	M		58	135	01/79	728	312	1,040	NA
	3000-30	16	S	M		50	105	10/79	1,067	458	1,525	NA
	3000-40	16	S	S		40	52	11/81	981	420	1,401	NA
	3000-44	16	S	M		40	52	03/81	2,709	732	3,441	NA
	3000-64	16	S	M		200	300	01/82	332	138	470	NA
	9020	32	S	S		28	45	01/83	0	0	0	NA
	9030, 9040	32	S	S		28	45	01/83	0	0	0	NA
								TOTAL	49,746	34,399	84,145	
HIS	(GE) 30	M	T	S		7	35	05/69	225	50	275	X
	(GE) 3010/3012	16	T	M		13	90	05/70	25	1	26	X
	112	12	T	S		5	10	11/69	222	48	270	X
	116/316/416/516	16	T	M		8	62	10/66	2,405	1,295	3,700	X
	700 Series	16	T	M		16	65	06/72	2,114	1,811	3,925	X
	6/06	16	T	S		7	42	01/76	4,025	2,907	6,932	NA
	6/23	16	T	S		6	25	--/78				
	6/33	16	T	S		4	40	05/78				
	6/34	16	T	S		4	18	01/76				
	6/36	16	T	S		4	35	01/76				
	6/30	16	T	S		23	33	02/81				
	6/31	16	T	S		20	35	02/81				
	6/32	16	T	S		26	48	02/81				
	6/34	16	T	S		30	57	02/81				
	6/38	16	T	S		25	88	02/81				
	6/43	16	S	M		7	110	01/77	5,950	4,771	10,721	NA
	6/47	16	S	M		19	160	08/78				
	6/53	16	S	M		19	145	05/78				
	6/57	16	S	M		44	225	--/78				
	6/48	16	S	M		33	116	02/81				
	6/54	16	S	M		39	138	02/81				
	6/74	16	S	M		65	221	02/81				
	6/76	16	S	M		75	273	02/81				
	6/92	32	S	M		110	412	10/81	105	161	266	NA
	6/96	32	S	M		130	670	10/81				
								TOTAL	15,071	11,044	26,115	
IBM	Series 1	16	T	S		0	30	11/76	29,500	11,500	41,000	X
Information Technology*	4900/10	16	T	S		10	20	10/65	25	0	25	X
Intel	86/330	16	T	S		2	19	02/82	500	200	700	NA
	330A	16	T	S		3	20	08/82	200	100	300	NA
	380X	16	T	S		3	26	08/82	400	200	600	NA
								TOTAL	1,100	500	1,600	
Intellimac	IN/7000K	68000	S	S		28	35	04/82	20	5	25	50
	IN/7000M	68000	S	S		50	50	07/82	5	0	5	20
								TOTAL	25	5	30	
Intersil	LSI 8	LSI 8	T	S		3	7	07/80	23	25	48	NA
Keronix*	IDS-16/8, 10, 12	16	T	S		3	5	04/74	2,900	270	3,170	X
Lear Siegler*	VDP-410	16	T	S		4	4	10/78	100	50	150	X
Lockheed Electronics*	LEC-16	16	T	S		11	18	03/69	2,590	435	3,025	X
	Sue	16	T	S		6	11	09/72	2,878	472	3,350	X
								TOTAL	5,468	907	6,375	
Microdata	400	M	T	S		3	4	01/70	155	0	155	X
	800 Series	M	T	S		6	11	05/69	2,055	1,380	3,435	X
	1600	M	T	S		5	11	02/72	6,825	1,177	8,002	X
	3200/3230	16	S	S		8	14	03/74	115	110	225	X
	Micro One	M	M	S		1	3	11/74	800	120	920	X
								TOTAL	9,950	2,787	12,737	
Minicomp*	MD-708	M	T	S		5	7	08/70	50	0	50	X
Modular Computer Systems	Modcomp I	16	T	S		2	9	10/71	698	142	840	X
	Modcomp II	16	T	S		13	41	03/71	2,231	534	2,765	X
	Modcomp III	16	S	S		13	44	12/70	72	5	77	X
	Modcomp IV	16/32	S	M		48	100	05/74	339	130	469	X
	Classic 7810	16	T	S		8	11	05/79	510	60	570	NA
	Classic 7820	16/32	T	S		18	49	12/80	95	15	110	NA
	Classic 7830	16/32	S	S		35	47	09/79	315	41	356	NA
	Classic 7840	16/32	S	S		9	22	12/80	215	36	251	NA
	Classic 7860	16/32	S	S		61	49	01/78	180	59	239	NA
	Classic 7870	16/32	S	M		78	159	08/78	385	155	540	NA
	Classic II/25	16/32	S	S		19	43	06/82	25	15	40	NA
	Classic II/45	16/32	S	M		38	82	06/82	80	40	120	NA
	Classic II/55	16/32	S	M		51	130	07/82	5	0	5	NA
	Classic II/75	16/32	S	M		86	153	05/82	40	20	60	NA
								TOTAL	5,190	1,252	6,442	
Motorola*	MDP-1000	M	T	S		8	19	02/69	75	0	75	X
NCR	Tower 1632	68000	T	S		12	28	20/83	0	0	0	NA
New England Digital*	Able Series 40	16	T	S		8	10	06/77	100	25	125	X
	Able Series 60	16	T	S		10	12	06/78	70	10	85	X
								TOTAL	175	35	210	
Omnitec (BIT)*	480	M	T	S		6	17	12/66	195	3	198	X
	483	M	T	S		9	33	01/70	115	40	155	X
								TOTAL	310	43	353	

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Name of Manufacturer	Computer Model	Word Length	Old Size Class	New Size Class	Notes	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Perkin-Elmer	PC	8	T	S		4	11	09/70	210	77	287	X
	2, 3, 4, 5	16	T	S		9	21	05/67	614	153	767	X
	13, 15, 16, 18	16	T	S		15	33	09/69	14	14	28	X
	50, 55	16+1	T	S		7	33	04/72	133	40	173	X
	70	16	T	M		9	65	12/71	1,108	348	1,456	X
	74	16	T	S		3	34	02/73	300	56	356	X
	8085	16	T	S		15	50	07/72	70	18	88	X
	5/16	16	M	S		1	5	01/77	269	78	347	X
	6/16	16	T	S		6	15	01/76	1,966	770	2,736	NA
	7/16	16	T	S		3	18	02/74	3,732	840	4,572	0
	8/16	16	T	S		12	25	01/77	852	226	1,078	NA
	7/32	32	S	S		16	36	07/74	1,682	477	2,159	NA
	8/32	32	S	M		68	160	06/75	859	281	1,140	NA
	Series 16	16	T	S		7	22	04/79	852	255	1,107	NA
	3220	32	S	M		39	100	05/79	772	386	1,158	X
	3210	32	S	M		42	80	09/81	162	70	232	NA
	3230	32	S	M		64	150	03/81	285	141	426	NA
	3240	32	S	M		105	192	10/79	283	87	370	X
	3250	32	S	M		150	190	02/82	79	47	126	NA
	3210/A	32	S	S		25	35	09/81	83	19	102	NA
	3200MPS	32	S	M		185	300	2Q/83	0	0	0	NA
	Cadam	32	S	M		140	220	05/78	71	4	75	NA
								TOTAL	14,396	4,387	18,783	
Plessey Peripheral Systems	6600	11/23	S	S		20	25	04/83	0	0	0	250
	6700	11/23	S	S		20	25	04/83	0	0	0	250
								TOTAL	0	0	0	
Plexus Computers	P/25	16	T	S		15	22	06/82	100	70	170	100
	P/40	16	S	S		38	41	09/81	70	32	102	100
	P/35	16/32	S	S		18	25	05/83	0	0	0	100
	P/60	16/32	S	S		43	47	05/83	0	0	0	100
								TOTAL	170	102	272	
Point 4 Data	Point 4 Mark 5	16	T	S		5	9	03/79	3,000	850	3,850	700
	Point 4 Mark 3	16	T	S		3	5	05/81	615	230	845	150
	Point 4 Mark 8	16	T	S		7	15	11/81	120	30	150	40
								TOTAL	3,735	1,110	4,845	
Polycomputers	301C	16	S	S		30	21	08/82	25	10	35	NA
	903A	16	S	S		67	40	11/82	4	0	4	NA
	1701A	16	S	S		100	60	2Q/83	0	0	0	NA
								TOTAL	29	10	39	
Prime Computer	100	16	T	S		6	12	04/73	310	560	870	X
	200	16	T	S		7	22	11/72	430	210	640	X
	300	16	S	S		12	58	09/73	460	350	810	X
	400	16	S	M		62	207	06/76	220	180	400	X
	500	16	S	M		126	330	06/76	80	40	120	X
	150 II	32	S	M		54	65	06/80	20	60	80	X
	250 II	32	S	M		50	75	06/80	309	730	1,039	NA
	350	16/32	S	M		31	116	07/78	200	120	320	X
	450	16/32	S	M		50	75	02/79	300	120	420	X
	550	16/32	S	M		70	105	02/79	1,315	800	2,115	X
	550 II	16/32	S	M		75	110	07/81	545	255	800	NA
	650	16/32	S	M		95	165	02/79	128	80	208	X
	750	32	S	M		130	200	07/79	985	353	1,338	NA
	850	32	S	M		275	370	07/81	105	40	145	NA
	2250	32	S	S		40	50	10/82	90	80	170	NA
								TOTAL	5,497	3,978	9,475	
Q1 Corporation	68000 Bay System	68000	S	S		15	30	08/83	0	0	0	10
Raytheon	703	16	T	S		13	23	10/66	179	33	212	X
	704	16	T	S		10	18	03/70	700	200	900	X
	706	16	T	S		19	30	05/69	75	17	92	X
	RDS 500	16	S	S		17	21	12/73	1,332	287	1,619	125
	RDS 550	16	S	S		14	14	10/80	446	0	446	150
								TOTAL	2,732	537	3,269	
Redcor Corp.*	RC 70	16+2	T	S		15	30	07/68	100	40	140	X
Ridge Computers	Ridge Thirty Two	32	S	S		55	60	08/82	1	0	1	80
SCI Systems	Venus 1000	16	M	S		4	8	--/83	0	0	0	NA
	Mercury 3	16	T	S		6	13	--/78	710	80	790	NA
	Mercury 2	16	T	S		5	12	--/83	0	0	0	NA
								TOTAL	710	80	790	
Sperry	5201	16	T	S		0	13	09/68	330	170	500	X
	620/a	16	T	M		0	75	12/65	120	30	150	X
	520/f, f-100	16	T	S		10	23	06/70	470	220	690	X
	620i	16/18	T	S		10	20	12/65	920	380	1,300	X
	620/L+100C	16	T	S		5	12	02/71	720	320	1,040	X
	620/L-100	16	T	S		6	14	06/72	1,095	554	1,649	X
	A620/1, R622/1	16/18	T	S		15	29	06/69	185	80	265	X
	V-72	16	T	S		10	45	02/74	1,130	453	1,583	X
	V-73	16	S	S		16	45	11/72	1,190	530	1,720	X
	V-74	L	S	M		40	80	05/74	210	90	300	X
	V-75	16	S	M		39	80	08/75	120	50	170	X
	V-76	16	S	S		8	16	01/76	754	329	1,083	X
	V-77-200	16	M	S		2	5	01/77	977	371	1,348	X
	V-77-400	16	T	S		5	28	12/76	326	235	561	X
	V-77-500	16	S	S		30	60	03/81	100	100	200	NA
	V-77-600	16	S	M		18	65	03/77	1,273	511	1,784	NA
	V-77-700	16	S	M		34	90	03/81	52	72	124	NA
	V-77-800	16	S	M		22	95	03/79	712	490	1,202	NA
								TOTAL	10,684	4,985	15,669	
Stratus	Stratus/32	32	S	M		12	200	02/82	28	7	35	75
Synapse	N+1	68000	S	M		0	340	4Q/82	0	0	0	NA
Systems Computer Corp.*	1000	M	T	S		1	4	01/71	400	200	600	X
Systems Engineering	32/30, 35	32	S	M		30	80	09/76	180	60	240	X
	32/55, 57	32	S	M		50	125	08/75	570	175	745	X
	32/75, 77	32	S	M		70	150	03/78	1,000	243	1,243	125
	32/27	32	S	S		25	60	02/81	638	160	798	800
	32/87	32	S	M		250	350	11/81	177	44	221	275
								TOTAL	2,565	682	3,247	

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Name of Manufacturer	Computer Model	Word Length	Old Size Class	New Size Class	Notes	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Tandem	Non Stop, Non Stop II	16	S	M		95	170	05/76	3,327	1,114	4,441	NA
Telefile	TCP-16/5	16	T	S		12	15	09/77	205	90	295	50
Texas Instruments	960-A/B	16	T	S		14	30	12/71	4,000	1,900	5,900	X
	980-A/B	16	S	S		17	40	10/72	4,050	1,800	5,850	X
	990/4	16	M	S		1	8	06/76	8,205	2,935	11,140	NA
	990/10	16	T	S		15	23	03/76	20,315	9,165	29,480	NA
	990/5	16	M	S		5	10	03/79	6,985	2,965	9,950	NA
	990/12	16	S	S		28	52	11/79	3,830	2,575	6,405	NA
	BS200	16	M	S		5	9	08/82	275	200	475	NA
								TOTAL	47,660	21,540	69,200	
Three Rivers Computer	Perq	TRC	S	S		27	29	08/80	300	600	900	NA
	System D/L	TRC	S	S		35	35	03/83	0	0	0	NA
								TOTAL	300	600	900	
Unicom, Inc.*	CP-8	M	T	S		3	8	02/70	343	165	508	X
Unicomp*	Comp-16	16	T	S		11	29	06/70	26	0	26	X
	Comp-18	18	T	S		12	38	08/70	38	0	38	X
								TOTAL	64	0	64	
Westinghouse Electric	P-50	14	T	S		16	23	08/64	182	40	222	X
	P-2000	16	T	S		10	27	08/69	111	97	208	4
	2500F	16	T	S		10	30	11/71	344	134	478	5
								TOTAL	637	271	908	
Xerox*	CE-16, 16A	16	T	S		8	23	06/69	35	0	35	X
	Sigma 2	16	T	M		24	125	12/66	5	0	5	X
								TOTAL	40	0	40	
								TOTAL	677,928	337,092	1,015,020	

Notes: a Digital Computer Controls was acquired by Data General in early 1977.
b Two Pi Corp was purchased by Four-Phase Systems, Inc. during 1980; Four-Phase was acquired by Motorola during 1982.
c Corporate name changed from Educational Data Systems, March 1, 1980.
* Not currently active in manufacturing or marketing Minicomputers.
NA Data is not available.
X Model is not in new production.

+!+ The code to IDC's new classifications:

M -- Medium Scale System;

S -- Small Scale System.

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SMALL BUSINESS COMPUTER CENSUS

The categorization of certain computers as "small business computers" is based on marketplace definitions as perceived by IDC. SBCs are those small general-purpose computers marketed to smaller businesses, first-time users, and increasingly to small units of large organizations. They include offerings from the major mainframers (such as IBM's System/32 and /34); from the minimakers, but aimed at commercial first-time users (such as DEC's Datasystem/300); from firms that manufacture only SBCs (such as Quantel); and from companies that market systems assembled from others' minicomputers (i.e., systems houses).

SMALL BUSINESS COMPUTER CENSUS AS OF JANUARY 1, 1983

Name of Manufacturer	Computer Model	Processor Model	New Size Class	Notes	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
A.M. Jacquard Systems	J100	J100	S		14	46	08/75	2,000	1,500	3,500	50
	J200	J100	S		22	55	09/82	10	10	20	20
	J300	J300	S		25	75	09/82	300	50	350	300
	J600	A.M. Jacquard	S		19	22	-/83	0	0	0	400
							TOTAL	2,310	1,560	3,870	
A.O. Smith*	Mesa Two	Nova 3	**		58	58	05/77	10	0	10	X
Advanced Information Design*	System 3000	Interdata X/16	S		24	39	03/75	41	0	41	X
Anderson Jacobson*	1400	AJ1400	S	a	16	22	01/70	260	15	275	X
	1520 Series	AJ1500	S		19	21	07/77	200	25	225	X
	1560 Series	AJ1500	S		30	35	07/77	60	3	63	X
							TOTAL	520	43	563	
Applied Computer Systems*	Smart Alec	8080-A	S		12	13	01/77	47	17	64	X
Applied Data Communications*	Event	Event 2000	S		13	20	02/77	156	12	168	X
	Clinic 2	Event 2000	S		19	23	06/79	20	0	20	X
	Event 3000	8080-A	S		22	22	12/79	11	0	11	X
	League Master	8080-A	S		23	23	--/80	2	0	2	X
							TOTAL	189	12	201	
Applied Data Processing, Inc.*	Resource 50	Nova 3/4	**		31	52	09/79	1	0	1	X
	Resource 100	Nova 3/12	**		41	72	06/79	16	0	16	X
							TOTAL	17	0	17	
Applied Digital Data Systems	Adds/Vantage	8080	**		11	14	07/76	550	400	950	X
	Mentor 3000	Z8001	S		25	28	12/82	6	2	8	200
	Mentor 4000	Z8001	S		33	45	08/81	398	112	510	450
	Mentor 5150	Z8001	S		65	75	12/82	2	0	2	75
	Mentor 5300	Z8001	M		79	99	12/82	3	0	3	75
							TOTAL	959	514	1,473	
Astrocom*	Series 760	Z80	PC		16	20	06/79	30	0	30	X
Ball Computer Products*	DASL	Nova 2/10	**		38	40	06/75	3	0	3	X
Basic Four Corporation	200	BFC1340	S		25	29	02/78	600	800	1,400	X
	350	BFC1300, Microdata	S	b	34	34	09/71	500	576	1,076	X
	400	BFC1300, Microdata	S	b	37	45	09/71	1,712	1,739	3,451	X
	410	BFC1300	S	b	33	41	10/78	1,500	1,850	3,350	X
	500	BFC1300, Microdata	S	b	39	50	07/72	100	82	182	X
	600	BFC1300, Microdata	S		51	65	03/75	300	308	608	X
	610	BFC1310	S		51	66	01/78	1,450	1,250	2,700	X
	700	BFC1320	M		115	130	--/77	109	99	208	X
	730	BFC1350	M		95	124	06/78	530	600	1,130	X
	210	BFC1345	S		25	29	07/81	550	600	1,150	NA
	310	BFC1350	S		55	60	01/82	80	70	150	NA
	510	BFC1345	S		44	61	--/80	530	500	1,030	NA
	710	BFC1350	S		69	72	01/82	100	110	210	NA
	810	BFC Basic 4	M		117	150	40/82	22	114	136	NA
							TOTAL	8,083	8,698	16,781	
Basic Time*	B-100	Digidyne	S		16	16	07/79	130	10	140	X
	B-200	Digidyne	S		20	20	11/79	35	5	40	X
							TOTAL	165	15	180	
Billings Computer Co.	BC-104	BC-104	PC		12	22	--/77	400	0	400	X
BRD, Inc.*	Dolphin	6800	S		18	20	06/77	400	30	430	X
	Porpoise	6800	PC		10	13	01/78	160	5	165	X
							TOTAL	560	35	595	
Briareus	SYS-200	EDS Point 4	**		20	40	01/76	160	0	160	NA
	SYS-100	EDS Point 4	**		29	35	03/82	10	0	10	10
	SYS-25	Microtech	**		20	27	12/82	5	0	5	25
							TOTAL	175	0	175	
Burroughs	B80	B80	S		17	29	11/76	8,340	13,560	21,900	NA
	B90	B90	S		18	33	12/79				
	B700	B700	S	c	26	68	03/73	1,800	1,500	3,300	NA
	B800	B800	S		35	51	05/77	5,712	3,208	8,920	NA
	B900	B900	S		61	76	08/80	1,655	745	2,400	NA
							TOTAL	17,507	19,013	36,520	
Business Systems Products*	Advisor	C.A. Syfa	**		42	50	07/76	111	0	111	X
Cado	System 20	8080	S		12	16	04/76	430	202	632	X
	20/4, 20/24	8085	S		16	27	04/78	3,061	1,403	4,464	NA
	40/4, 40/44	8085	S		20	37	05/78	431	21	452	X
	20/2, 20/22	8085	S		15	16	06/79	437	228	665	X
	20/28	Dual 8085	S		23	30	05/80	573	227	800	NA
	System 40, 1000	8080	S		18	20	03/77	568	114	682	X
	CAT I	8085	S		10	12	05/80	826	598	1,424	NA
	CAT II	8085	S		15	17	08/80	953	548	1,501	NA
	CAT III	8085	S		9	13	06/82	315	193	508	NA
							TOTAL	7,594	3,534	11,128	NA
Cascade Data Inc.*	80/20, 30, 40	Concept	S		28	42	01/70	50	0	50	X
	Concept II	Concept	S		27	35	06/75				
	Concept III, IV	Concept	S		17	29	01/78	334	15	349	X
							TOTAL	384	15	399	

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Centurion Computer Corp.	Centurion IA	CC-205	S	d	18	19	--/77	60	0	60	X
	Centurion IIA	CC-205	S		27	30	--/75	95	0	95	X
	Centurion Series 100	CC-205	S		15	15	--/79	124	20	144	X
	Centurion III	CPU 5	S		30	36	--/74	604	46	650	X
	Centurion Series 200	CPU 5	S		27	27	--/79	130	34	164	X
	Centurion Series 6000	CPU 6	S		33	40	10/79	225	50	275	NA
	Centurion Series 5200	CPU 6	S		20	21	05/82	40	6	46	NA
	Centurion Series 5300	CPU 6	S		22	24	05/82	40	6	46	NA
	Micro Plus Series	CPU 5, CPU 6	S		10	11	01/82	365	45	410	NA
							TOTAL	1,683	207	1,890	
Century Computer Corp.	CC200	CC200	S		27	49	03/75	1,661	1,600	3,261	400
	Opus III	CC200	PC		15	22	02/71	560	110	670	X
	BPM	CC200	S		19	50	12/80	131	0	131	X
							TOTAL	2,352	1,710	4,062	
Cetec (Automated Business Concepts)	Mesa Two	Nova 4	**	e	50	73	04/78	70	0	70	X
	Maps	Digidyne	**		40	46	02/82	65	0	65	25
							TOTAL	135	0	135	
CIE Systems	680/20	68000	S		9	14	07/82	22	0	22	NA
	680/40	68000	S		19	24	06/82	4	0	4	NA
	680/30	68000	S		10	16	11/82	4	0	4	NA
							TOTAL	30	0	30	
Cincinnati Milacron*	George 40, 60, 70, 80	CIP/2200B, 4400	S		16	35	--/74	670	150	820	X
Clary Data Systems*	404	Clary	PC		6	30	01/70	100	32	132	X
Complete Computer Corp.	10, 11, 12	Nova 3/12, 4X	**		30	44	03/74	46	0	46	15
	14, 16, 18	Nova 3/12, 4X	**		45	58	10/76	29	0	29	X
	20, 22, 24	Nova 3/12, 4X	**		58	74	09/77	8	0	8	X
	40, 44	Nova 4X	**		48	65	01/80	24	0	24	X
							TOTAL	107	0	107	
Compucorp*	402	Compucorp 3000	PC		13	15	01/76	15	455	470	X
	450	Compucorp 3000	PC		20	22	04/76	40	115	155	X
							TOTAL	55	570	625	
Computer Hardware Inc.*	2120	CHI	S		15	50	05/75	10	1	11	X
	2130C	CHIC	S		32	75	07/74	350	4	354	X
	21300	CHID	M		44	120	01/78	10	0	10	X
	3230	CHI	S		15	50	06/76	100	0	100	X
	4210	CHI	S		13	13	09/77	4	0	4	X
	4250	CHI	S		37	45	06/78	7	0	7	X
							TOTAL	481	5	486	
Computer Interactions Inc.*	Compo II-8	PDP-8/e, f, m	**		31	50	11/72	600	0	600	X
	Compo II-11	PDP-11	**		37	53	06/75	440	0	440	X
	Word Pro II	PDP-8, Nova, HP	**		13	17	02/77	820	0	820	X
							TOTAL	1,860	0	1,860	
CYB Systems	Multibox	68000	S		10	22	04/82	110	0	110	900
Data General	CS/5	Micro Nova	**		6	11	3Q/82	400	100	500	X
	CS/10	Micro Nova	**		11	13	11/80	1,400	900	2,300	X
	CS/20	Micro Nova	**		11	20	07/78	180	120	300	X
	CS/30	Micro Nova	**		21	25	08/79	780	220	1,000	500
	CS/40	Nova 3/12	**		33	40	10/77	600	400	1,000	1,100
	CS/50, CB/50	Micro Nova 45, 4X	**		32	65	--/80	675	225	900	X
	CS/60	Eclipse	**		40	75	07/78	360	115	475	X
	CS/70	Eclipse	**		36	43	11/80	200	125	325	X
	CS/100	Eclipse	**		18	24	3Q/82	115	35	150	X
	CS/200	Eclipse	**		25	30	3Q/82				
	Design Data EC300	Eclipse C/300	**	f	60	150	03/76	50	10	60	75
	Design Data N312	Nova 3/12	**	f	31	75	08/75	90	10	100	125
	Synergist 1500	Micro Nova	**		8	24	--/76	15	5	20	X
	Synergist 1550	Micro Nova	**		14	21	01/78	35	5	40	X
	Synergist 2500	Nova 3/12	**		27	40	--/76	150	10	160	X
	Synergist 3700	Nova 3/D	**		40	60	--/76	15	5	20	X
							TOTAL	5,065	2,285	7,350	
Decision Data Computer*	System/4	System/4	S		23	37	08/76	15	0	15	X
Diablo Systems Inc.*	3200	8080	S	g	19	23	01/77	3,000	3,200	6,200	X
Digital Equipment Corp.	Datasystem 300	PDP-8, PDP-11	**		14	30	--/72	9,400	6,000	15,400	400
	Datasystem 500	PDP-11	**		58	115	--/72	1,975	1,900	3,875	X
	DECstation 78/88	PDP-8	**		8	11	03/78	1,775	1,150	2,925	X
	DECstation 78/88	PDP-8A	**		12	15	03/78				
	Datasystem 700	VAX 11/750	**		NA	138	--/81	142	0	142	X
	Datasystem 700	VAX 11/780	**		NA	300	--/81	67	0	67	X
							TOTAL	13,359	9,050	22,409	
Digital Systems	Galaxy/5	Galaxy/5	M		87	110	01/76	26	0	26	20
	Galaxy/3	Galaxy/3	S		47	60	01/80	10	0	10	10
							TOTAL	36	0	36	
Dimis, Inc.	Total 100	Modcomp II, Classic	**		110	155	06/74	56	0	56	12
Display Data Corp.	Series 8000	Microdata 1600/30	S		33	36	05/82	148	2	150	15
	Insight, ELS Sys., Insight 80	Microdata 1600/30	S		23	26	01/74	1,522	15	1,537	60
							TOTAL	1,670	17	1,687	
DTC*	Task Master	8080	S		17	19	09/78	25	90	115	X
Evolution Computer	Series I	ETI	M	h	65	77	11/73	206	28	234	X
	Series II	ETI	M		88	97	10/77	180	10	190	X
	240, 260, 280	ETI	S		37	63	02/81	225	27	252	200
							TOTAL	611	65	676	

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Name of Manufacturer	Computer Model	Processor Model	New Size Class	Notes	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Financial Computer Corporation*	System 111/6	System 111	S		19	25	09/77	28	0	28	X
	System 111/8	System 111	S		23	32	09/77	22	0	22	X
	System 111/10	System 111	S		30	45	01/75	440	55	495	X
							TOTAL	490	55	545	
General Automation	OM-130/2	SPC-16/45	**		28	28	12/74	150	350	500	X
	OM-130	SPC-16/45	**		30	38	12/74	80	180	260	X
	OM-140	SPC-16/65	**		48	80	01/75	7	18	25	X
	440-DS	GA 16/440	**		38	70	01/76	35	65	100	X
	460-DS	GA 16/460	**		35	80	11/78	10	30	40	X
	Instacode	GA 16/230	**		34	34	06/80	8	6	14	X
							TOTAL	290	649	939	
General Information*	GIS-350 Able	PDP-11/34	**		36	40	01/76	20	0	20	X
General Robotics	Gemini Series	LSI-11	**		5	8	07/76	350	650	1,000	500
	Tristar Series	LSI-11	**		11	22	07/76	175	325	500	X
	Pegasus Series	LSI-11	**		8	13	09/77	229	423	652	200
	Scorpio	LSI-11	**		3	8	07/81	105	195	300	400
							TOTAL	859	1,593	2,452	
GRI Computer*	System 99	GRI 99/50	**		30	35	11/74	196	88	284	X
	System 99/E	GRI 99/52	**		43	50	11/77	35	15	50	X
	Grip	GRI	S		30	30	11/78	25	0	25	X
							TOTAL	256	103	359	
Hewlett-Packard	HP 250	HP 250	S		16	28	09/78	1,900	2,400	4,300	NA
	HP 300	HP 300	S		30	58	09/78	220	310	530	NA
							TOTAL	2,120	2,710	4,830	
IBM	System/32	IBM S/32	S		27	42	03/75	4,400	4,250	8,650	X
	System/34	IBM S/34	S		30	64	12/77	58,000	34,000	92,000	NA
	System/36	IBM	M		30	56	10/83	0	0	0	NA
							TOTAL	62,400	38,250	100,650	
ICL (U.S. Only)	System 25	ICL	S		35	55	01/82	8	-	8	1,000
	DBS 20	ICL	S		7	25	03/82	75	-	75	3,000
							TOTAL	83	-	83	
Incomnet	Lotus Basic	Z80001	S		20	35	07/83	0	0	0	20
	Lotus Executive	Z80001	S		30	40	09/83	0	0	0	15
	Lotus Advanced	Z80001	S		50	70	05/83	0	0	0	35
							TOTAL	0	0	0	
Indep	Apogee III	Z80A	S		12	20	2Q/82	10	0	10	10
Independent Business Systems	Betasystem 2	Z80A	S		5	10	11/80	160	40	200	600
Infotecs	IMP	IM 6100	PC		10	15	09/77	855	128	983	NA
	CC2	IM 6100	S		10	25	01/80	1,500	193	1,693	NA
							TOTAL	2,355	321	2,676	
Interactive Systems Technology	IST-86	8086	S		13	14	10/82	50	0	50	2,000
International Computing*	System 95/99	Nova 2/10	**		25	35	10/72	9	0	9	X
Kalbro Computer Services*	BDS 500	Microdata 1600	**		30	48	03/77	41	0	41	X
	BDS 1000	Microdata 1600	**		35	55	06/72	82	0	82	X
	BDS 2000	Microdata 1600	**		43	73	10/73	94	0	94	X
	BDS 4000	Microdata 1600	**		51	85	10/79	8	0	8	X
							TOTAL	225	0	225	
Keydata	Unity Series	Nova 3/4, 3/12, 30	**	i	48	80	04/79	35	1	36	X
Lockheed Electronics*	System III	Sue	**		30	50	01/73	465	130	595	X
Logical Machine	Adam I, Adam II, Adam	Adam	S		25	29	04/75	580	850	1,430	NA
	Tina	Tina	S		18	20	12/78	500	1,200	1,700	NA
	David	Logical	S		6	6	--/80	400	1,550	1,950	NA
	Goliath	Goliath	S		28	40	11/80	60	120	180	NA
							TOTAL	1,540	3,720	5,260	
Martin Wolfe, Inc.*	Mesa Two 7000	DCC-116	**		54	81	12/71	140	0	140	X
	Mesa Two 4000	DCC-116	**		62	93	02/76	3	0	3	X
							TOTAL	143	0	143	
MDS Qantel	210, 110	Q29	S	j	12	17	11/77	215	690	905	X
	800, 900	Q7	S		28	29	05/75	85	62	147	X
	950	Q7	S		28	33	11/75	600	240	840	X
	960	Q7.5	S		30	35	11/76	300	100	400	X
	970	Q29B	S		36	40	01/79	250	150	400	X
	1200	Q7	S		42	59	11/75	200	20	220	X
	1300	Q7.5	S		42	59	11/75	40	15	55	X
	1400-2	Q7.5	S		44	70	05/77	360	170	530	X
	1450-2	Q29B	M		45	80	01/79	200	50	250	X
	200 Series	Q29B	S		30	57	03/80	1,399	744	2,143	X
	300 Series	Q29B	M		50	80	03/80	471	97	568	X
	20 Series	Q29B	S		23	30	11/81	520	180	700	600
	40 Series	Q30	M		50	80	10/82	110	10	120	500
	64 Series	Q64	M		150	225	04/83	0	0	0	100
	L	Q29B	S		14	18	04/83	0	0	0	900
							TOTAL	4,750	2,528	7,278	
Micro Business Applications	Micron 440	Z80, 8085	S		15	19	12/81	2	0	2	NA
	Micron 740	8085	PC		25	30	--/78	29	0	29	X
	Micron 840	Z80, 8085	S		25	33	05/81	6	0	6	NA
							TOTAL	37	0	37	
Microdata	Reality	M.data 1600	**		32	60	12/73	2,785	518	3,303	NA
	Reality 2000	M.data 1600	**		32	37	06/79	121	11	132	NA
	Reality 4000	M.data 1600	**		38	41	06/79	651	92	743	NA
	Reality 6000	M.data 1600	**		51	60	06/79	1,685	117	1,802	NA
	Reality 8000	M.data 1600	**		89	100	09/80	424	46	470	NA
	Sequel	M.data	**		163	175	12/81	91	77	168	NA
							TOTAL	5,757	861	6,618	

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Name of Manufacturer	Computer Model	Processor Model	New Size Class	Notes	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Micromation	Mariner (Z80A)	Z-80A	S		10	18	01/80	700	1,200	1,900	2,400
	Mariner (8088)	8088	S		10	18	01/83	0	0	0	750
							TOTAL	700	1,200	1,900	
Microstar*	Microstar I, II	Z80	PC		13	18	12/78	5	0	5	X
Microtech Business Systems	System 50, 100, 200, 300, 400	Point 4	**		15	35	--/79	800	0	800	200
	M1 Series	M1	S		12	24	12/82	50	0	50	1,100
							TOTAL	850	0	850	
Midwest Scientific*	MSI-6800AW	6800	S		8	15	05/79	1,000	850	1,850	X
Mini-Computer Systems	Micos 100	Nova 3/4	**		20	25	08/77	200	225	425	35
	Micos 200	Nova 3/12	**		35	60	--/73	1,100	500	1,600	100
	Micos 300	Dual Nova 3/12	**		100	140	01/79	25	4	29	40
	Micos 75	Nova 3/4	**		26	26	09/79	18	16	34	X
	Micos 85	Nova 3/4	**		36	41	--/80	22	28	50	X
	Micos 250	Micos 250 CPU	S		50	75	12/82	4	0	4	25
	Micos 350	Micos 350 CPU	M		115	165	08/82	6	0	6	25
							TOTAL	1,375	773	2,148	
Minicom Systems	P/4	Point 4	**		8	10	--/82	30	14	44	100
	D128 Series	Minicom	S		8	10	01/81	270	30	300	200
	32/64	Point 4	**		16	20	05/81	135	0	135	X
							TOTAL	435	44	479	
Minuteman Computer Corporation	1774	Nova 3/4, 4/5	**		29	40	11/71	80	0	80	X
	1775	Nova 3/12, 4/16	**		25	35	03/72	60	0	60	12
	1776	Nova 3/12, 4/16	**		30	45	03/72	75	0	75	17
	1776/A	Nova 3/12, 4/16	**		35	65	05/77	70	0	70	20
							TOTAL	285	0	285	
Molecular Computers	Supermicro 32X	Z80B	S		19	19	06/83	0	0	0	NA
	Supermicro 64X	Z80B	S		23	23	06/83	0	0	0	NA
							TOTAL	0	0	0	
Mylee Digital Sciences	3000 Series	Mylee 3G	S		35	56	05/76	284	0	284	70
NCR	8130, 40, 50	NCR	S		15	23	02/77	937	3,600	4,537	NA
	9010	NCR	S		14	18	04/81	176	1,000	1,176	NA
	9020	NCR	S		25	28	03/81	1,180	2,700	3,880	NA
	9040	NCR	M		107	120	05/81	375	1,030	1,405	NA
	9050	NCR	M		135	150	05/81	81	125	206	NA
	8200, 30/31, 50/51	NCR	S		27	55	09/74	5,950	6,900	12,850	X
	9300		M		24	59	20/83	0	0	0	NA
							TOTAL	8,699	15,355	24,054	
NEC Information Systems (U.S. Only)	210	NEC	S		11	17	06/79	107	-	107	NA
	230	NEC	S		11	25	06/79	1,450	-	1,450	NA
	250	NEC	S		25	45	06/79	470	-	470	NA
	270	NEC	S		27	59	11/81	207	-	207	NA
							TOTAL	2,234	-	2,234	
Nixdorf (U.S. Only)	8870/1, /3	8013, 8015	S		22	72	--/78	750	-	750	200
Norfield Datasystems*	Nova System	Nova	**		35	50	06/73	20	0	20	X
Novell Data Systems	NEXUS 1	Nexus	PC		12	12	04/81	578	248	826	X
Olivetti	S-6000	Olivetti	S		19	35	01/82	70	-	70	NA
Onyx	4000	8086	S	k	15	20	10/80	100	250	350	200
	3000	8086, 8087	S	k	32	32	05/82	10	20	30	20
	5000	8088	S	k	12	13	05/81	250	450	700	200
	2000	8088	S		7	11	08/82	100	150	250	500
							TOTAL	460	870	1,330	
OSM Computer	Zeus 2	Z80	S		17	22	03/82	300	100	400	NA
	Zeus 3	Z80	S		8	12	07/82	200	150	350	NA
	Zeus 4	Z80	S		4	7	12/82	85	50	135	NA
							TOTAL	585	300	885	
Parallel Computer Co.	CPU-16/100, 200	68000	S		25	30	12/82	2	0	2	225
Pertec	3000	68000	S		19	60	10/82	105	195	300	NA
Plessey Peripheral Systems	SBC 200 Series	LSI 11/23	**		26	34	11/81	0	50	50	X
Prodigy Systems	Prodigy 1, 2	Z80-A	S		9	12	05/79	350	50	400	NA
Programmed Control	Prophet 21/1	TI 960/8	**		42	75	--/72	40	0	40	X
	Prophet 21/2	TI 990/10	**		57	100	01/78	95	2	97	X
	Prophet 21/3	Prophet	S		40	50	04/83	0	0	0	NA
	Prophet 21/4	Prophet	M		50	85	06/83	0	0	0	NA
	Prophet 21/5	Prophet	M		90	125	09/83	0	0	0	NA
							TOTAL	135	2	137	
Q1 Corporation	Q1/LMC	Z80, 8080	S		10	21	02/74	600	75	675	10
	Q1/Lite	Z80	S		6	24	02/77	700	450	1,150	50
	Q1 Microlite	Z80	S		10	13	02/79	250	330	580	20
	Q1 68000	68000	S		7	13	08/82	3	1	4	25
							TOTAL	1,553	856	2,409	
R2E OF America (U.S. Only)	XM	Z80	PC		0	20	03/82	20	-	20	NA
Randal Data Systems*	R-100 Series	Randal	PC		14	17	10/75	257	13	270	X
	R-200 Series	Randal	S		24	30	10/76	382	0	382	X
	R-300/400 Series	Nova 2/10	**		34	45	06/74	27	0	27	X
	R-500 Series	Randal	S		42	47	10/77	45	0	45	X
							TOTAL	711	13	724	
Retail Sciences, Inc.*	Clerk 700	PE 5/16	**		19	19	10/78	18	5	23	X
	Clerk 800	PE 5/16	**		25	25	04/79	25	15	40	X
							TOTAL	43	20	63	

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Rexon Business Machines	RX15	8086	S		20	22	02/81	175	414	589	NA
	RX20	8086	S		23	28	04/80	149	75	224	NA
	RX30	8086	S		27	43	07/79	304	235	539	NA
	RX100	8086-2	S		11	15	10/82	25	31	56	NA
	RX400	8086-2	S		21	30	05/82	104	98	202	NA
							TOTAL	757	853	1,610	
Reynolds & Reynolds	VIM III	BTI 500	**		30	45	--/78	2,200	420	2,620	NA
	Expansion 6000	Z80	S		36	42	05/81	260	51	311	NA
							TOTAL	2,460	471	2,931	
Sentinel Computer	Sentinel Series	8086	S		21	39	07/79	125	75	200	NA
Space Byte Computer*	DBM/1	8086	PC		6	13	07/78	55	10	65	X
	DBM/2	Z80	PC		13	15	06/79	10	0	10	X
							TOTAL	65	10	75	
Span Management Systems*	TSS2	IBM Series 1	**		31	31	--/77	10	3	13	X
Sperry	BG 7	Univac	S		26	46	04/77	2,182	1,218	3,400	500
STC Systems	2000	Nova 3/12	**		34	80	09/72	108	2	110	X
	3000	Nova 3D	**		55	90	11/75	72	2	74	X
	4000	Nova 4	**		45	65	11/77	80	0	80	15
	5000	Nova 4X	**		54	125	10/82	125	0	125	25
	6000	Nova 4X	**		108	225	10/82	2	0	2	10
							TOTAL	387	4	391	
Symcro Systems	SB 700	SB 700	S		19	30	04/81	3	0	3	NA
Technico	TI32	TI9900	S		15	20	09/80	100	12	112	NA
Texas Instruments	BS600	16	**		30	40	08/82	200	125	325	300
Tri-Star Inc.*	TTK-10	Nova 3/12	**		45	55	02/76	12	0	12	X
	TEK-80	Nova	**		52	67	04/76	4	0	4	X
							TOTAL	16	0	16	
Ultimate Corp.	1000	LSI	**		28	35	11/82	25	0	25	X
	2000	LSI	**		34	40	11/81	225	50	275	NA
	750	LSI/11	**		20	20	04/83	0	0	0	NA
	C, D, E	Level 6 DPS/6	**		60	80	01/80	600	200	800	NA
							TOTAL	850	250	1,100	
Vanguard Computer	V400	Raytheon RDS500	**		45	52	06/77	2	0	2	X
	V500	Raytheon RDS500	**		65	85	03/76	6	3	9	X
							TOTAL	8	3	11	
Victory Computer Systems	Spirit	80186	S		14	18	06/83	0	0	0	NA
	Factor	68000	S		14	18	06/83	0	0	0	NA
							TOTAL	0	0	0	
Wang	2200	2200	S		10	19	04/73	12,040	9,460	21,500	X
	2200VP, MVP	2200VP, MVP	S		11	31	09/76	9,033	7,092	16,125	NA
	VS-25	2200VS	S		25	45	12/82	20	15	35	NA
	VS-45	2200VS	M		21	85	10/82	100	80	180	NA
	VS-80	2200VS	M		36	104	07/77	2,424	1,918	4,342	NA
	VS-90	2200VS	M		73	163	01/82	240	150	390	NA
	VS-100	2200VS	M		83	265	01/81	640	500	1,140	NA
	2200LVP, SVP	2200LVP, SVP	S		10	20	09/80	4,140	3,250	7,390	NA
							TOTAL	28,637	22,465	51,102	
Wintex Computer	200NS	Wintex	S		12	18	01/75	95	1	96	X
	MT 200	Wintex	S		10	20	10/79	210	0	210	X
	MT 86	Wintex	S		10	15	10/83	0	0	0	5
							TOTAL	305	1	306	
Zilog	8000	Z8001	S		15	30	07/81	490	210	700	X
							TOTAL	214,423	151,924	366,347	

Notes:
- a Includes installations of Eldorado 140.
- b Used Microdata processors until 11/76.
- c Includes retirements of Model B700.
- d Corporate name was changed from Warrex Computer Corporation when it was purchased by Electronic Data Systems, January 29, 1981.
- e Corporate name was changed from Automated Business Concepts in 1982, and from Broadcast Management Concept, March 1, 1980.
- f Marketed in the U.S. by Shasta General Systems.
- g Computer Hardware Division purchased from Pickland Associates during 1980.
- h Two Pi Corp was purchased by Four-Phase Systems, Inc. during 1980; Four-Phase was acquired by Motorola during 1982.
- i Qantel was acquired by Mohawk Data Sciences in 1980.
- j Mercator Business Systems was acquired by Onyx in November 1982 and its products incorporated into the Onyx line.
- k Corporate name changed from Educational Data Systems, March 1, 1980.
- * Not currently active in manufacturing or marketing Small Business Computers.
- ** To avoid double counting under the new classification, the system is tracked at the level of processor model only.
- NA Data is not available.
- X Model is not in new production.

+++ The code to IDC's new classifications:

M -- Medium Scale System;

S -- Small Scale System.

PC -- Personal Computer

NOTES TO MULTI-USER MICRO CENSUS

IDC is in the midst of redefining its system classes. Multi-user micros have been pulled out of the traditional desktop census to be placed in a small scale system category that will appear in next year's Review and Forecast. As far as installed base and forecasts go, multi-user micros are included in the "Desktop Computer" Red pages of the Review and Fore- cast Part 1 (July 8, 1983). They are not part of the "Personal Computer" numbers. We regret any confusion.

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MULTI-USER MICRO CENSUS

MULTI-USER MICRO CENSUS, AS OF JANUARY 1, 1983

Name of Manufacturer	Computer Model	Processor Model/Word Length	Old Size Class	New Size Class	Notes	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Advanced Micro Digital	Superquad	Z80	D	2		1	1	01/82	7,000	2,500	9,500	10,000
Altos Computer Systems	ACS 8000-2	Z80	D	2		5	5	06/77	1,710	1,140	2,850	NA
	ACS 8000-5	Z80	D	2		6	7	10/79	900	600	1,500	X
	ACS 8000-6	Z80	D	2		10	10	11/79	720	480	1,200	X
	ACS 8000-7	Z80	D	2		11	11	--/78	1,080	720	1,800	X
	ACS 8000-10	Z80	D	2		9	9	05/81	2,880	1,920	4,800	NA
	ACS 8000-12	Z80	D	2		10	10	09/81	4,500	3,000	7,500	NA
	ACS 8000-14	Z80	D	2		12	12	09/81	3,360	2,250	5,610	NA
	ACS 8000-15	Z80	D	2		5	5	--/81	1,620	1,080	2,700	NA
	ACS 8600-12	8086	D	2		13	14	--/82	700	300	1,000	NA
	ACS 8600-14	8086	D	2		13	14	--/82				
	ACS 586-10	8086	D	2		8	8	01/83	0	0	0	NA
	ACS 580-10	Z80	D	2		6	6	02/83	0	0	0	NA
								TOTAL	17,470	11,490	28,960	
Artec Electronics*	Artec Systems	8085-A2	D	2		6	7	11/80	79	3	82	X
Barrington Computer Corp.	E'lite	Z80B	D	2		8	10	08/82	100	9	109	1,250
Billings Computer Co.	BC 6000	Z80	D	2		4	5	12/82	30	0	30	NA
Callan Data Systems	Unistar 200	68000	D	2		14	14	03/83	0	0	0	1,750
Canon (U.S. Only)	AS-100	8088	D	2		2	5	03/83	0	-	0	NA
Century Computer	Vanguard 8000	8086	D	2		3	9	10/82	55	12	67	1,000
Codata Systems Corp.	Codata 3300	68000	D	2		8	10	01/83	0	0	0	1,200
Columbia Data Products	964	Dual Z80-A	D	2		3	5	09/79	436	138	574	NA
	1600-1, 2, 3	8088	D	2		3	4	08/82	850	150	1,000	6,000
								TOTAL	1,286	288	1,574	
Compal	8200	Z80	D	2		13	14	01/80	1,600	35	1,635	1,000
Compupro	816	8085/8088	D	2		5	7	04/82	2,000	1,000	3,000	NA
Datamac Corp.	1600 Series	8086	D	2		3	5	08/82	45	5	50	2,500
	1600 Series	68000	D	2		9	14	04/83	0	0	0	500
								TOTAL	45	5	50	
Dataview Corp.	300 M	Z80	D	2		8	8	06/82	50	0	50	800
Digilog Business Systems	1800	Dual Z80-A	D	2		7	7	03/82	200	150	350	1,500
	1850	Dual Z80-A	D	2		2	2	09/82	80	20	100	200
								TOTAL	280	170	450	
Dual Systems Control Corp.	System 83	68000	D	2		17	22	01/82	147	3	150	400
Durango Systems	800 Series	8085	D	2		8	10	03/82	625	625	1,250	NA
	900 Series	8085	D	2		12	14	03/82	500	500	1,000	NA
								TOTAL	1,125	1,125	2,250	
Dynabyte	5200	Z80	D	2		4	5	--/78	1,840	860	2,700	X
	5300, 5305	Z80	D	2		5	7	--/79	1,050	700	1,750	X
	5400	Z80	D	2		7	9	--/79	450	250	700	X
	5800	Z80	D	2		18	23	--/80	125	75	200	X
	5900	Z80	D	2		19	25	--/80	175	100	275	X
	5505	Z80	D	2		7	10	--/81	900	800	1,700	X
	5605	Z80	D	2		7	11	--/81	1,410	940	2,350	150
	5710	Z80	D	2		9	13	--/81	1,240	760	2,000	300
	Monarch 6600	Z80, 8086	D	2		9	11	09/82	295	295	590	3,600
								TOTAL	7,485	4,780	12,265	
Eagle Computers	1600 Series	8086	D	2		7	7	12/82	40	10	50	NA
Elite Corp.	Consultant	16032	D	2		18	18	03/83	0	0	0	500
Empirical Research Group	ERG Series	68000/16032	D	2		8	14	04/81	100	240	340	250
Epic Computer Products	Episode	Z80-A	D	2		2	2	09/80	600	400	1,000	3,000
Fortune Systems Corp.	32:16	68000	D	2		5	7	04/82	2,400	350	2,750	NA
Fujitsu (U.S. Only)	Micro 16 S	Z80, 8086	D	2		4	4	12/82	5	-	5	13,000
Gimix, Inc.	Gimix	6809	D	2		3	7	--/80	1,400	600	2,000	NA
	Gimix	6800	D	2		1	1	--/78	700	300	1,000	NA
								TOTAL	2,100	900	3,000	
Hardy Computer Corp.	8001	8086	D	2		5	9	07/81	69	35	104	NA
	256	Z80-B	D	2		1	3	12/82	4	0	4	450
								TOTAL	73	35	108	
IMS International	5000	Z80, 8088	D	2	j	4	5	06/79	3,600	2,400	6,000	6,000
	8000	Z80, 8088	D	2		4	7	06/79	4,500	4,300	8,800	4,000
								TOTAL	8,100	6,700	14,800	

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Instrumentation Laboratory/Pixel Division	100/AP	68000	D	2		10	15	06/82	500	200	700	1,000
	80 Supermicro	68010	D	2		10	14	2Q/83	0	0	0	NA
								TOTAL	500	200	700	
Integrated Business Computers	IBC-40	Z80-A	D	2		9	13	--/80	200	300	500	X
	Cadet	Z80-B	D	2		10	15	07/81	800	600	1,400	2,000
	Mini Cadet	Z80-B, H	D	2		9	11	07/83	0	0	0	600
								TOTAL	1,000	900	1,900	
Keydata	Challenger	6502, 6800	D	2	k	1	5	--/78	12,145	1,655	13,800	X
	200 Series	6502, Z80	D	2		5	10	05/82	537	80	617	NA
	300 Series	Z80	D	2		9	15	03/83	0	0	0	NA
								TOTAL	12,682	1,735	14,417	
Micro V Corp.	Microstar I	8085A	D	2		8	15	08/78	2,250	2,250	4,500	1,000
	Microstar II	8086	D	2		12	25	09/80				
	Series 3000	8086	D	2		13	20	05/81				
	Series 1000	8088	D	2		3	8	09/82				
								TOTAL	2,250	2,250	4,500	
Micromation	M. System (Z80A)	Z-80A	D	2		7	7	10/82	50	20	70	1,000
	M. System (8088)	8088	D	2		7	7	01/83	0	0	0	500
								TOTAL	50	20	70	
Nabu Manufacturing Corp.	1600	8086, 8087	D	2		10	13	03/82	200	1,000	1,200	NA
NEC Information	200	NEC	D	2		5	7	06/82	850	-	850	NA
NNC Electronics	80	Z80	D	2		5	5	02/80	520	315	835	NA
	80W	Z80	D	2		9	9	11/80	540	315	855	NA
	53	Z80	D	2		10	14	11/82	10	0	10	NA
								TOTAL	1,070	630	1,700	
North Atlantic Industries	SBC-1 Shoebox	LSI-11/2	D	2		2	2	01/81	300	100	400	400
North Star Computers	Horizon	Z80-A	D	2		4	4	12/77	27,400	7,100	34,500	NA
Olivetti (U.S. Only)	P-6060	Olivetti	D	2		13	13	--/77	1,000	-	1,000	X
	P-6066	Olivetti	D	2		12	12	03/81	1,600	-	1,600	NA
								TOTAL	2,670	-	2,670	
Onyx	Sundance 2	Z-80A	D	2		9	10	05/82	91	39	130	125
	Sundance 16	Z-8000	D	2		14	15	1Q/83	0	0	0	
	C-5001/MU	Z-80A	D	2		8	9	09/81	290	125	415	200
	C-5000 1A	Z-80A	D	2		6	7	05/82	105	45	150	200
	C-5000 2A	Z-8000	D	2		12	13	02/83	0	0	0	200
	C-8001/MU	Z-80A	D	2		12	14	05/81	1,204	516	1,720	1,000
	C-8002	Z-8000	D	2		17	19	08/80	1,185	510	1,695	1,000
	C-8002A	Z-8000	D	2		14	17	02/83	0	0	0	1,000
Pertec	PCC 2000	8085A	D	2		8	13	09/78	1,670	2,870	4,540	NA
R2E OF America (U.S. Only)	Micral 9050	8086	D	2		5	5	09/82	0	-	0	NA
Rair Microcomputer	Black Box 3/20, 30, 50	8085	D	2		7	7	05/81	550	2,395	2,945	2,000
	3/60	8088	D	2		10	10	04/83	0	0	0	400
								TOTAL	550	2,395	2,945	
S.D. Systems	SD 100	Z80	D	2		7	7	04/78	200	65	265	X
	SD 200	Z80	D	2		10	10	05/77	455	150	605	X
	SD 700	Z80	D	2		20	21	09/80	85	30	115	X
	SD 610	Z80	D	2		14	15	02/81	130	55	185	X
	WS 800	Z80	D	2		2	4	02/82	5	0	5	X
	SD 300	Z80-A, B, H	D	2		2	2	2Q/83	0	0	0	1,500
								TOTAL	875	300	1,175	
Smoke Signal Broadcasting	Chieftan I	6800	D	2		2	3	03/79	2,500	1,000	3,500	NA
	Chieftan II	6809	D	2		2	3	03/80	2,250	750	3,000	NA
								TOTAL	4,750	1,750	6,500	
Systems Group	System 2900	Z80	D	2		6	8	08/81	0	0	0	NA
	Business Express	Z80	D	2		6	10	11/82	160	40	200	NA
	System 3200	68000	D	2		18	20	3Q/83	0	0	0	NA
								TOTAL	160	40	200	
Tab Products	1650	8088	D	2		9	10	1Q/83	0	0	0	NA
	1660	8088	D	2		12	15	2Q/83	0	0	0	NA
								TOTAL	0	0	0	
Tarbell Electronics	Empire I	Z80	D	2		5	5	01/81	100	0	100	50
	Empire II	Z80	D	2		5	5	03/81	100	0	100	50
								TOTAL	200	0	200	
Vector Graphics	5005	Z80-B	D	2		7	12	05/81	929	168	1,097	300
	5010	Z80-B	D	2		8	13	01/83	0	0	0	NA
	5032	Z80-B	D	2		12	16	02/82	253	54	307	NA
								TOTAL	1,182	222	1,404	
Wicat	System 150-3WS	68000	D	2		11	11	04/82	600	300	900	1,200
	System 150-6WS	68000	D	2		13	13	04/82	300	150	450	600
								TOTAL	900	450	1,350	
Zax Corp.*	The Box	Z80-A	D	2		5,995	5,995	01/82	0	800	800	2,500
	The Box	8086	D	2		6,995	7,995	03/83	0	0	0	3,000
								TOTAL	0	800	800	
								TOTAL	117,700	56,845	174,615	

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REVIEW & FORECAST
Part I

"The Gray Sheet"

EDP industry report
● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

MOLLY UPTON, EDITOR JUNE 28, 1982 ● VOL.18,NO.5 P.J. MCGOVERN, PUBLISHER

DESKTOP SALES KNOW NO BOUNDS, JOIN MINIS AND WEAK ECONOMY TO GANG UP ON SMALL BUSINESS MARKET

Although both 1981 and 1982 have been dominated by the heady success and media attention given to desktop computers, the story has had its dark side as well. The price/performance and efficient distribution of today's desktops, coupled with a glum economy and falling minicomputer prices, are quickly deflating the once robust market for small business computers.

Indeed in 1981 the value of U.S. desktop shipments surpassed that of small business computers (SBCs); 1982 will show the same result for the worldwide market. Such is the difference in growth rates that by 1983, the value of the worldwide installed base of desktops will exceed that of SBCs, a remarkable turnaround given the nearly 3:1 SBC advantage held as recently as 1980.

International Data Corporation, publisher of EDP/IR, estimates that the value of worldwide desktop shipments will grow at 43.5% from $3 billion in 1981 to $18.3 billion in 1986. Small business computers, on the other hand, will grow at a compound rate of just 9.5%, from $3.4 billion in 1981 to $5.3 billion by 1986. Together the value of the worldwide desktop and SBC markets grew 32% over 1980, and will increase at a compound rate of 29.9% from 1981-1986, from $6.4 billion to $23.6 billion. Among some of the key trends:

- The value of 1981 U.S. SBC shipments remained flat at 1980 levels, reflecting the weak economy and a decline in average system cost. U.S. desktop shipment value was up 78% in 1981.
- The giants of the industry are making their moves. IBM and Xerox jumped in 1981; Wang and DEC have followed in 1982.
- Over two-thirds of all U.S. manufacturer's 1981 desktop shipments went to the U.S. market; for SBCs the figure was nearly 60%.
- Japanese vendors have confined their efforts to international markets, although their U.S. presence is now beginning to increase.

SUBSCRIBER NOTE: This year's Review and Forecast will be delivered in two parts; the mainframe and minicomputer segment will appear later.

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VALUE OF WORLDWIDE SHIPMENTS -- DESKTOP AND SMALL BUSINESS COMPUTERS
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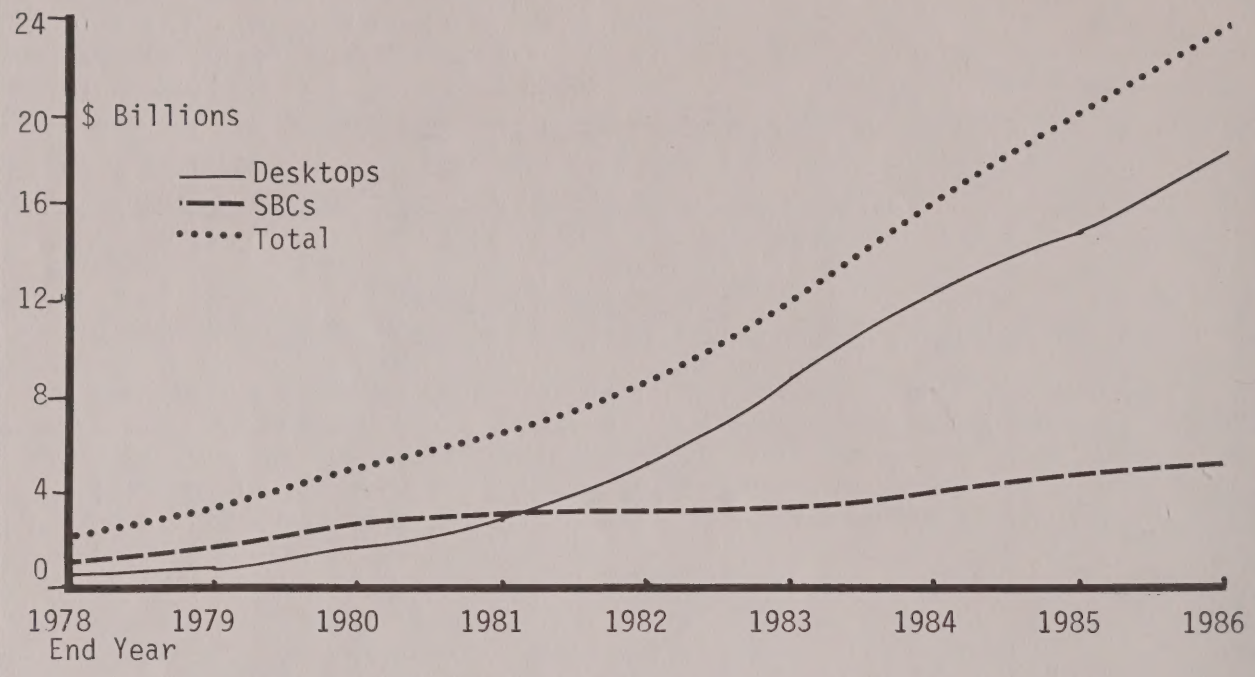

IDC has made substantial revisions in both its desktop and SBC forecasts. High activity in the business/professional and home market have upped desktop estimates; whereas desktop and mini competition and declining average system values have reduced expectations for SBCs.

The move to 16-bit desktops

Whereas 1980 and the early part of 1981 were characterized by scads of Z80 based desktops running CP/M, 1982 has been marked by the push to 16- and 16/32 bit systems. One current fad is for a desktop to have co-processors -- an 8-bit CPU that handles current CP/M applications and a 16- or 16/32 bit CPU that will prove more handy when 16-bit applications are readily available. The implementation of CP/M by major manufacturers such as Hewlett-Packard and Xerox has strengthened its position as a de facto 8-bit desktop standard.

Desktop operating system software generally falls into three camps: CP/M for the 8-bit; CP/M-86 and MS-DOS for the Intel 8088 and 8086-based units, and Unix for the Motorola 68000, which is dubbed a 16/32-bit system. Thus far, the Intel group has won the large vendors -- IBM, Burroughs, Wang, and NCR -- whereas the 68000 has been the favorite of many start ups. DEC, Honey- well, and Data General are among those taking their minicomputer architectures down to the desktop level, leveraging software investment, and preparing for the day when the desktop replaces the traditional low-end mini.

The business of system software for desktops and some small business computers is growing by leaps and bounds. Microsoft, known for its compilers, and Digital Research, licenser of CP/M, had 1981 system software package revenues of $14- and $11 million, respectively, and rank among the top five independent suppliers of system software, according to IDC. Digital Research tied for the top spot in terms of 1981 operating system revenues, along with Western Electric, licenser of Unix, while Microsoft took top honors in the

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U.S DESKTOP MARKET BY UNIT SHIPMENTS AND APPLICATION
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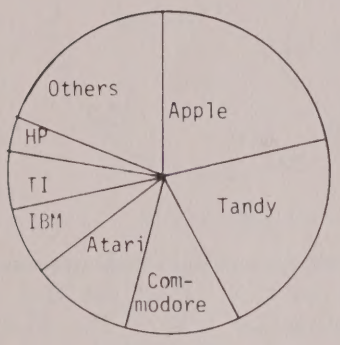
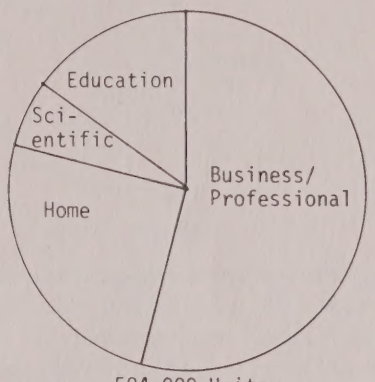
Unit Shipments 1981



584,000

U.S. DESKTOP SHIPMENTS
BY SECTOR, 1981



584,000 Units

packaged compiler/assembler category among independent suppliers. An important side benefit is that the focus on just a few microprocessors and a few operating systems is hastening the day of widespread desktop software compatibility.

Market definitions

16-bit microprocessors have become important to both desktops and SBCs. This has led to to an overlap in IDC's traditional market definitions. IDC defines desktop computers as being microprocessor based, including their own power supply and enclosure, and capable of attaching peripherals; they have a minimum of 4K of memory, are programmable in a high level language and are priced from less than $1,000 to up to $15,000. SBC's have at least 4K of memory, are configured with peripherals and applications software, and are targeted at business applications. Prices generally run between $20,000 and $100,000. Given these definitions, the obvious gray area is the $15,000-$20,000 range, with systems by Altos and Wicat being typical examples.

By value, the fastest growing desktop sectors in terms of worldwide shipment rates between 1981 and 1986 are: business/professional, 51%; home/hobby, 40%; scientific, 16%; and educational, 11%. The rates in the U.S. are 54%, 42%, 15%, and 12% respectively. Since the U.S. market is growing faster than the international market (47% to 33%), the U.S. manufacturer's share of the value of worldwide shipments will increase from 68% in 1981 to 78% by 1986.

In terms of units installed in the U.S., Tandy still leads the pack with 29%, down from 35% in 1980, followed by Apple, Commodore, and Atari. Despite shipping its personal computer for only three months and its Datamaster for five months, IBM upped its share to 6.9%, compared to the 3.3% its 5100 series had in 1980. As for 1982, Commodore, Tandy, Atari, and Texas Instruments say that this will be a big year for the home with a boom in systems in the $400 to $800 range. Commodore continues to make hay in Europe.

Despite the presence of today's market leaders and the entrance of the industry's giants, the desktop arena continues to attract swarms of new ventures.

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1981 U.S. SBC MARKET, SEGMENTATION BY UNITS AND VALUE
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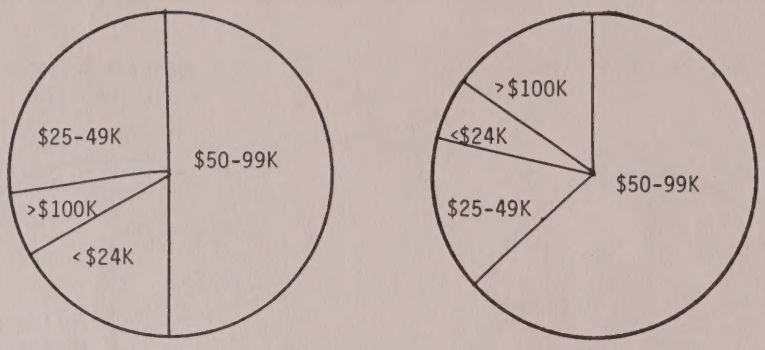

40,800 Units $1,980 Million

IDC counts some 92 companies selling desktops in the U.S.; if the international market is included, the number of vendors approaches 150. The list of companies trying to marry desktops with 5.25" Winchester disks is also lengthening. Yet despite the obvious competition, vendors such as Fortune Systems, Grid, and Convergent Technologies, have had no trouble getting financing and gaining market momentum; less secure perhaps are the numerous Z80 system vendors.

Distribution is also becoming a key factor as vendors search for the right mix of direct sales, distributors, and retail outlets. Vendors must simultaneously battle for retail shelf space and struggle for pricing consistency; to appease its dealers, Apple had to raise the prices it charged Computerland, damaging its valuable tie to the 200 store chain.

Small business market squeezed by economy

Numerous pressures are working against the small business computer market. With prices in the $20,000 to $100,000 range, SBCs are running up against ever more powerful desktops as well as sharply falling minicomputer prices with DEC's new baby Vax 11/730 being a prime example. The SBC customer base faces the highest rate of bankruptcies since the 1930s and persistent high interest rates continue to force buyers to postpone new purchases and upgrades.

At the same time, more is being asked of SBC vendors; there is new demand for office automation features as well as clearly defined upgrade paths. The cost of traditional strengths such as documentation and support is rising, but system prices must fall to meet the demands of competition. Most SBC vendors are concentrating on the low and middle half of the market because it offers the widest customer base and the possibility for future upgrades. Emphasis on hard disks, tape back-up and service must offset the lower costs of desktops which are often oversold and may fail to live up to many small business tasks.

The unexciting market numbers are also somewhat of a definitional creation. IBM's System/34 constitutes 25% of the installed U.S. SBC base, and 35% of the installed value. Many of these S/34 users are migrating to S/38s which IDC classifies as a general purpose machine; thus the actual SBC growth is somewhat understated. Since many S/34 users do not want to go through the difficult conversion to the S/38, IDC expects a follow on to the S/34 (S/36?) by the end of 1982; it will be classified as an SBC and give the market a mild boost in the 1983 and 1984 timeframe.

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SMALL BUSINESS COMPUTER MARKET -- U.S.-BASED MANUFACTURERS[a]

	Number of Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1976	22,200	39,000	870	1.6
1977	33,100	72,100	1,270	2.8
1978	43,200	113,800	1,850	4.6
1979	56,000	165,400	2,640	7.1
1980	64,100	224,700	3,110	10.0
1981	68,700	287,500	3,370	13.1
1982	77,800	356,800	3,580	16.4
1983	87,900	433,200	3,860	19.7
1984	99,900	518,200	4,390	23.6
1985	112,600	612,100	4,840	27.6
1986	126,000	715,200	5,300	31.8
		UNITED STATES		
1976	14,600	27,000	570	1.1
1977	21,900	48,900	840	1.9
1978	26,400	73,800	1,140	3.0
1979	31,400	101,500	1,530	4.4
1980	38,200	135,900	1,980	6.2
1981	40,800	172,600	1,980	8.0
1982	45,500	212,900	2,090	9.9
1983	51,900	258,300	2,280	11.9
1984	58,900	309,200	2,590	14.2
1985	66,300	365,800	2,850	16.6
1986	74,200	428,400	3,120	19.2
		INTERNATIONAL		
1976	7,600	12,000	300	0.5
1977	11,200	23,200	430	0.9
1978	16,800	40,000	710	1.6
1979	24,600	63,900	1,110	2.7
1980	25,900	88,800	1,130	3.8
1981	27,900	114,900	1,390	5.1
1982	32,300	143,900	1,490	6.5
1983	36,000	174,900	1,580	7.8
1984	41,000	209,000	1,800	9.4
1985	46,300	246,300	1,990	11.0
1986	51,800	286,800	2,180	12.6

[a] International Manufacturers with U.S.-based sales offices are counted in the U.S totals, but not international.

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DESKTOP COMPUTER MARKET -- U.S.-BASED MANUFACTURERS[a]

	Number of Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1976	9,000	16,000	128	0.2
1977	34,000	50,000	244	0.5
1978	163,000	213,000	562	1.1
1979	277,000	490,000	1,036	2.0
1980	454,000	944,000	1,779	3.7
1981	819,000	1,763,000	3,006	6.8
1982	1,520,000	3,283,000	5,372	12.1
1983	2,533,000	5,816,000	8,744	20.9
1984	3,636,000	9,452,000	12,364	33.3
1985	4,552,000	14,004,000	15,481	48.7
1986	5,434,000	19,438,000	18,286	67.0
		UNITED STATES		
1976	4,000	8,000	59	0.1
1977	25,000	33,000	168	0.3
1978	128,000	161,000	397	0.7
1979	184,000	345,000	668	1.3
1980	326,000	671,000	1,142	2.4
1981	584,000	1,255,000	2,035	4.5
1982	1,129,000	2,384,000	3,869	8.3
1983	1,938,000	4,322,000	6,685	15.0
1984	2,794,000	7,116,000	9,635	24.7
1985	3,463,000	10,579,000	12,077	36.7
1986	4,082,000	14,661,000	14,218	50.9
		INTERNATIONAL		
1976	5,000	8,000	69	0.1
1977	9,000	17,000	76	0.2
1978	35,000	52,000	165	0.4
1979	93,000	145,000	368	0.7
1980	128,000	273,000	637	1.3
1981	235,000	508,000	971	2.3
1982	397,000	899,000	1,503	3.8
1983	595,000	1,494,000	2,059	5.9
1984	842,000	2,336,000	2,729	8.6
1985	1,089,000	3,425,000	3,404	12.0
1986	1,352,000	4,777,000	4,068	16.1

[a] International Manufacturers with U.S.-based sales offices are counted in the U.S totals, but not international.

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SMALL BUSINESS COMPUTER CENSUS

The categorization of certain computers as "small business computers" is based on marketplace definitions as perceived by IDC. SBCs are those small general-purpose computers marketed to smaller businesses, first-time users, and increasingly to small units of large organizations. They include offerings from the major mainframers (such as IBM's System/32 and 34); products such as DEC's Datasystem/300 from the minimakers, but aimed at commercial first-time users; equipment from firms (such as Qantel) that manufacture only SBCs; and products from companies that market systems assembled from others' minicomputers (i.e., systems houses).

SMALL BUSINESS COMPUTER CENSUS AS OF JANUARY 1, 1982

Name of Manufacturer	Computer Model	Processor Model	Notes	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Advanced Information Design*	System 3000	Interdata X/16		24	39	03/75	41	0	41	X
A.M. Jacquard Systems	J100	J100		14	46	08/75	1,620	1,200	2,820	50
Anderson Jacobson*	1400	AJ 1400	a	16	22	01/70	260	15	275	X
	1520 Series	AJ 1500		19	21	07/77	200	25	225	X
	1560 Series	AJ 1500		30	35	07/77	60	3	63	X
						TOTAL	520	43	563	
Applied Computer Systems*	Smart Alec	8080-A		12	13	01/77	47	17	64	X
Applied Data Communications	Event	Event 2000		13	20	02/77	156	12	168	X
	Clinic 2	Event 2000		19	23	06/79	20	0	20	X
	Event 3000	8080-A		22	22	12/79	11	0	11	X
	League Master	8080-A		23	23	--/80	2	0	2	X
						TOTAL	189	12	201	
Applied Data Processing, Inc.*	Resource 50	Nova 3/4		31	52	09/79	1	0	1	X
	Resource 100	Nova 3/12		41	72	06/79	16	0	16	X
						TOTAL	17	0	17	
Applied Digital Data Systems, Inc.*	Adds/Vantage	8080		11	14	07/76	550	400	950	X
Astrocom	Series 760	Z80		16	20	06/79	30	0	30	NA
Automated Business Concepts	Mesa Two	Nova 4	b	50	73	04/78	70	0	70	4
	Maps	Digidyne		40	50	02/82	0	0	0	30
						TOTAL	70	0	70	34
Ball Computer Products*	DASL	Nova 2/10		38	40	06/75	3	0	3	X
Basic Four Corporation	200	BFC 1340		25	29	02/78	600	800	1,400	X
	350	BFC 1300, Microdata	c	34	34	09/71	500	576	1,076	X
	400	BFC 1300, Microdata	c	37	45	09/71	1,712	1,739	3,451	X
	410	BFC 1300		33	41	10/78	1,500	1,850	3,350	X
	500	BFC 1300, Microdata	c	39	50	07/72	100	82	182	X
	600	BFC 1300, Microdata	c	51	65	03/75	300	308	608	X
	610	BFC 1310		51	66	01/78	1,450	1,250	2,700	X
	700	BFC 1320		115	130	--/77	109	99	208	X
	730	BFC 1350		95	124	06/78	530	600	1,130	X
	210	BFC 1345		25	29	07/81	50	30	80	X
	310	BFC 1350		55	60	01/82	0	0	0	NA
	510	BFC 1345		44	61	--/80	330	270	600	NA
	710	BFC 1350		69	72	01/82	0	0	0	NA
	810	BFC Basic 4		117	150	4Q/82	0	0	0	NA
	Newport	Basic 4		150	230	4Q/82	0	0	0	NA
						TOTAL	7,181	7,604	14,785	
Basic Time	B-100	Digidyne		16	16	07/79	130	10	140	X
	B-200	Digidyne		20	20	11/79	35	5	40	X
						TOTAL	165	15	180	
Billings Computer Co.*	BC-104	8080-A		12	22	--/77	400	0	400	X
BRD, Inc.*	Dolphin	6800		18	20	06/77	400	30	430	X
	Purpose	6800		10	13	01/78	160	5	165	X
						TOTAL	560	35	595	
Briareus	Briareus	EDS Point 4		20	40	01/76	140	0	140	35
Burroughs	B20	B20	d	8	20	07/82	0	0	0	NA
	B80	B80		17	29	11/76	7,200	11,700	18,900	NA
	B90	B90		18	33	12/79				NA
	B700	B700		26	68	03/73	2,000	1,600	3,600	X
	B800	B800		35	51	05/77	5,700	3,200	8,900	NA
	B900	B900		61	76	08/80	400	150	550	NA
						TOTAL	15,300	16,650	31,950	
Business Systems Products*	Adviser	C.A. Syfa		42	50	07/76	111	0	111	X
Cado	Cado Sys. 20	8080		12	16	04/76	430	202	632	X
	Cado Sys. 40, 1000	8080		18	20	03/77	568	114	682	X
	Cado Sys. 20/4 20/24	8085		16	27	04/78	2,755	1,251	4,006	NA
	Cado Sys. 40/4, 40/44	8085		20	37	05/78	431	21	452	NA
	Cado Sys. 20/2, 20/22	8085		15	16	06/79	437	228	665	NA
	Cado Sys. 20/28	Dual 8085		23	30	05/80	350	157	507	NA
	CAT I	8085		10	12	05/80	686	432	1,118	NA
	CAT II	8085		15	17	08/80	272	78	350	NA
	CAT III	8085		9	13	06/82	0	0	0	NA
						TOTAL	5,929	2,483	8,412	
Cascade Data, Inc.	80/20, 30, 40	Concept		28	42	01/70	50	0	50	X
	Concept II	Concept		27	35	06/75				X
	Concept III	Concept		32	39	01/78	334	15	349	X
	Concept IV	Concept		17	19	04/78				X
						TOTAL	384	15	399	

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Centurion Computer Corporation	Centurion IA	CC-205	e	18	19	--/77	60	0	60	X
	Centurion IIA	CC-205		27	30	--/75	95	0	95	X
	Centurion Ser. 100	CC-205		15	15	--/79	124	20	144	X
	Centurion III	CPU 5		30	36	--/74	604	46	650	NA
	Centurion Ser. 200	CPU 5		27	27	--/79	130	34	164	NA
	Centurion Ser. 6000	CPU 6		24	30	01/80	130	30	160	NA
	Centurion Ser. 5200	CPU 6		21	NA	05/82	0	0	0	NA
	Centurion Ser. 5300	CPU 6		23	NA	05/82	0	0	0	NA
	Micro Plus Series	CPU 5		10	NA	01/82	0	0	0	NA
						TOTAL	1,143	130	1,273	
Century Computer Corporation	CC200	C-200		27	49	03/75	661	272	933	350
	Opus III	C-200		15	22	02/71	560	110	670	X
	BPM	C-200		19	50	12/80	131	0	131	NA
						TOTAL	1,352	382	1,734	
CIE Systems	680/20	68000		9	14	07/82	0	0	0	NA
	680/40	68000		19	24	06/82	0	0	0	NA
Cincinnati Milacron*	George 40	CIP/2200B		16	20	02/77				X
	George 60	CIP/2200B		26	34	--/76				X
	George 70	CIP/2200B		26	35	--/76	670	150	820	X
	George 80	CIP/4400		43	60	12/76				X
	Other	CIP/2200B		23	34	--/74				X
Clary Data Systems*	404	Clary		6	30	01/70	100	32	132	X
Complete Computer Corporation	10, 11, 12	Nova 3/12, 4X		34	44	03/74	36	0	36	15
	14, 16, 18	Nova 3/12, 4X		45	58	10/76	29	0	29	X
	20, 22, 24	Nova 3/12, 4X		58	74	09/77	8	0	8	X
	40, 44	Nova 4/X		48	65	01/80	24	0	24	7
						TOTAL	97	0	97	22
Compucorp*	402	Compucorp 3000		13	15	01/76	15	455	470	X
	450	Compucorp 3000		20	22	04/76	40	115	155	X
						TOTAL	55	570	625	
Computer Hardware, Inc.	2120	CHI		15	50	05/75	10	0	10	X
	2130C	CHIC		32	75	07/74	350	4	354	X
	2130D	CHID		44	120	01/78	10	1	11	X
	3230	CHI		15	50	06/76	100	0	100	X
	4210	CHI		13	13	09/77	4	0	4	X
	4250	CHI		37	45	06/78	7	0	7	X
						TOTAL	481	5	486	
Computer Interactions, Inc.	Compo II-8	PDP-8/e,f,m		31	50	11/72	600	0	600	NA
	Compo II-11	PDP-11		37	53	06/75	440	0	440	NA
	Word Pro II	PDP-80, Nova, HP		13	17	02/77	820	0	820	NA
						TOTAL	1,860	0	1,860	
Data General	CS/5	Micro Nova		6	11	3Q/82	0	0	0	NA
	CS/10	Micro Nova		11	13	11/80	720	480	1,200	NA
	CS/20	Micro Nova		11	20	07/78	180	120	300	NA
	CS/30	Micro Nova		21	25	08/79	780	220	1,000	NA
	CS/40	Nova 3/12		33	40	10/77	600	400	1,000	NA
	CS/50, CB50	Micro Nova 45, 4X		32	65	--/80	675	225	900	NA
	CS/60	Eclipse		40	75	07/78	300	100	400	NA
	CS/70	Eclipse		36	43	11/80	120	80	200	NA
	CS/100	Eclipse		18	27	3Q/82	0	0	0	NA
	CS/200	Eclipse		25	30	3Q/82	0	0	0	NA
	Design Data EC300	Eclipse C/300	f	60	150	03/76	50	10	60	X
	Design Data N312	Nova 3/12	f	31	75	08/75	90	10	100	X
	Synergist 1500	Micro Nova	g	8	24	--/76	15	5	20	NA
	Synergist 1550	Micro Nova	g	14	21	07/78	35	5	40	NA
	Synergist 2500	Nova 3/12	g	27	40	--/76	150	10	160	NA
	Synergist 3700	Nova 3/D	g	40	60	--/76	15	5	20	NA
						TOTAL	3,730	1,670	5,400	
Datamedia Corporation	932	68000		15	20	3Q/82	0	0	0	NA
Decision Data Computer Corporation*	System/4	System/4		23	37	08/76	15	0	15	X
Diablo Systems, Inc.	3200	8080	h	19	23	01/77	2,100	2,600	4,700	NA
D.H. Minicom, Inc.	32/64	Point 4		16	20	05/81	135	0	135	NA
Digital Equipment Corporation	Datasystem 300	PDP-8, PDP-11		14	30	--/72	8,900	5,700	14,600	NA
	Datasystem 500	PDP-11		58	115	--/72	1,900	1,850	3,750	NA
	DEC Station 78	PDP-8		8	11	09/78	1,650	1,100	2,750	NA
	DEC Station 88	PDP-8A		12	15	03/78				NA
	Datasystem 700	VAX 11/750		NA	138	--/81	95	0	95	NA
	Datasystem 700	VAX 11/780		NA	300	--/81	45	0	45	NA
						TOTAL	12,590	8,650	21,240	
Digital Systems Corporation	Galaxy/5	Galaxy/5		90	120	01/76	35	0	35	20
	Galaxy/3	Galaxy/3		50	65	01/80	6	0	6	
						TOTAL	41	0	41	20
Dimis, Inc.	Total 100	Modcomp II, Classic	i	110	155	06/74	52	0	52	NA

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Display Data Corporation	Insight	Microdata 1600/30		38	59	01/74	1,500	12	1,512	400
	ELS System	Microdata 1600/30		27	33		25	0	25	X
						TOTAL	1,525	12	1,537	
DTC	Task Master	8080		17	19	09/78	25	90	115	X
Evolution Computer Systems Corporation	Series I	Multi 6	j	65	77	11/73	206	28	234	X
	Series II	Multi 6		88	97	10/77	180	10	190	X
	240	Multi 6		37	42	02/81				
	260	Multi 6		55	63	02/81	165	22	187	200
	280	Multi 6		94	105	02/81				
						TOTAL	551	60	611	200
Financial Computer Corporation*	System 111/6	System 111		19	25	09/77	28	0	28	X
	System 111/8	System 111		23	32	09/77	22	0	22	X
	System 111/10	System 111		30	45	01/75	440	55	495	X
						TOTAL	490	55	545	
General Automation	OM-130/2	SPC-16/45		28	28	12/74	150	350	500	X
	OM-130	SPC-16/45		30	38	12/74	80	180	260	X
	OM-140	SPC-16/65		48	80	01/75	7	18	25	X
	440-DS	GA 16/440		38	70	01/76	35	65	100	X
	460-DS	GA 16/460		35	80	11/78	10	30	40	X
	Instacode	GA 16/230		34	34	06/80	8	6	14	15
						TOTAL	290	649	939	15
General Information Systems	GIS-350 ABLE	PDP-11/34		36	40	01/76	20	0	20	X
General Robotics Corporation	Gemini Series	LSI-11		10	21	07/76	251	250	501	100
	Tristar Series	LSI-11		11	22	07/76	111	110	221	20
	Pegasus Series	LSI-11		18	39	09/77	157	157	314	X
	Scorpio	LSI-11		7	10	07/81	19	19	38	250
						TOTAL	538	536	1,074	370
GRI Computer Corporation	System 99	GRI 99/50		30	35	11/74	196	88	284	X
	System 99/E	GRI 99/52		43	50	11/77	35	15	50	X
	GRIP	GRI		30	30	11/78	25	0	25	X
						TOTAL	256	103	359	
Hewlett-Packard	HP 250	HP 250		19	34	09/78	1,400	1,900	3,300	1,500
	HP 300	HP 300		30	58	09/78	210	300	510	20
						TOTAL	1,610	2,200	3,810	1,520
ICL, Inc. (U.S. Only)	System 25	ICL		35	80	01/82	0	-	0	NA
	DBS 20	ICL		9	25	03/82	0	-	0	NA
Infotecs	IMP	IM 6100		10	15	09/77	848	128	976	800
	CC2	IM 6100		16	22	01/80	999	93	1,092	
						TOTAL	1,847	221	2048	800
IBM	System/32	IBM S/32	k	27	42	03/75	5,600	4,600	10,200	X
	System/34	IBM S/34		35	66	12/77	42,500	24,000	66,500	20,000
						TOTAL	48,100	28,600	76,700	20,000
International Computing Corporation*	System 95/99	Nova 2/10		24	35	10/72	9	0	9	X
Kalbro Computer Services	BDS 500	Microdata 1600	l	30	48	03/77	41	0	41	
	BDS 1000	Microdata 1600		35	55	06/72	82	0	82	10
	BDS 2000	Microdata 1600		43	73	10/73	94	0	94	
	BDS 4000	Microdata 1600		51	85	10/79	8	0	8	X
						TOTAL	225	0	225	10
Keydata	Unity Series	Nova 3/4, 3/12, 30		48	80	04/79	35	1	36	X
Lockheed Electronics Company, Inc.	System III	Lockheed Sue		30	50	01/73	465	130	595	X
Logical Machine Corporation	ADAM I	ADAM		30	35	04/75	479	547	1,026	X
	TINA	TINA		18	20	12/78	400	1,100	1,500	NA
	ADAM II	ADAM		25	30	10/79	38	220	258	X
	GOLIATH	GOLIATH		28	45	11/80	40	100	140	NA
						TOTAL	957	1,967	2,924	
Martin Wolfe, Inc.*	Mesa Two 7000	DCC-116		54	81	12/71	140	0	140	X
	Mesa Two 4000	DCC-116		62	93	02/76	3	0	3	X
						TOTAL	143	0	143	
Merrator Business Systems	4000	8086		22	23	10/80	84	156	240	300
	3000	8088		15	16	05/81	196	364	560	100
	5000	8086, 8087		33	NA	05/82	0	0	0	100
						TOTAL	280	520	800	500
Micro Business Applications	Micron 400	Z80, 8085		15	19	12/81	2	0	2	NA
	Micron 700	Z80, 8085		25	30	03/80	29	0	29	X
	Micron 800	8085		25	33	05/81	6	0	6	NA
						TOTAL	37	0	37	
Microdata	Reality	Microdata 1600		32	60	12/73	2,780	516	3,296	NA
	Reality 2000	Microdata 1600		32	37	06/79	109	11	120	NA
	Reality 4000	Microdata 1600		38	49	06/79	566	64	630	NA
	Reality 6000	Microdata 1600		51	66	06/79	1,106	117	1,223	NA
	Reality 8000	Microdata 1600		89	109	02/80	351	46	397	NA
	Sequel	Microdata		153	163	12/81	4	0	4	NA
						TOTAL	4,915	753	5,670	

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Micromation	Marmer	Z80-A		13	18	01/80	150	200	350	NA
Microstar, Inc.*	Microstar I	Z80		13	17	12/78	5	0	5	X
	Microstar II	Z80		14	19	12/78				X
Microtech Business Systems, Inc.	System 50	Point 4		19	23	--/80				
	System 100	Point 4		20	29	--/80				
	System 200	Point 4		23	31	--/71	355	1	356	200
	System 300	Point 4		27	39	--/79				
	System 400	Point 4		46	60	--/78				
Midwest Scientific	MSI-6800AW	6800	m	8	11	05/79	700	850	1,550	200
Mini-Computer Systems, Inc.	Micos 100	Nova 3/4		26	40	08/77	170	190	360	NA
	Micos 200	Nova 3/12		40	60	--/73	1,035	465	1,500	NA
	Micos 300	Dual Nova 3/12		100	140	01/79	16	4	20	NA
	Micos 75	Nova 3/4		26	26	09/79	18	16	34	X
	Micos 85	Nova 3/4		36	41	--/80	22	28	50	X
						TOTAL	1,261	703	1,964	
Minutemen Computer Corporation	1774	Nova 3/4, 4/5		30	40	11/71	80	0	80	
	1775	Nova 3/12, 4/16		32	44	03/72	50	0	50	70
	1776	Nova 3/12, 4/16		35	59	03/72	60	0	60	
	1776/A	Nova 3/12, 4/16		35	65	05/77	55	0	55	
						TOTAL	245	0	245	
Mylee Digital Sciences, Inc.	3000 Series	Mylee 3G		33	56	05/76	230	0	230	70
NCR Corporation	8130	NCR		19	23	03/78				NA
	8140	NCR		15	16	05/80	933	3,550	4,483	NA
	8150	NCR		27	34	02/77				NA
	9010	NCR		14	18	04/81	130	150	280	NA
	9020	NCR		25	28	03/81	150	300	450	NA
	9040	NCR		107	120	05/81	215	700	915	NA
	9050	NCR		135	150	05/81	21	25	46	NA
	8200	NCR		33	63	09/74	5450			NA
	8230/31	NCR		27	42	06/77	5,850	6,800	12,650	NA
	8250/51	NCR		29	60	12/76				NA
						TOTAL	7,299	11,525	18,824	
NEC (U.S. Only)	210	NEC		16	17	06/79	70	-	70	NA
	230	NEC		20	29	06/79	500	-	500	NA
	250	NEC		30	55	06/79	200	-	200	NA
	270	NEC		27	73	11/81	10	-	10	NA
						TOTAL	780	-	780	
Nixdorf Computer (U.S. Only)	8870/1	8013, 8015		29	45	--/78	750	-	750	NA
	8870/3	8033, 8035		38	60	01/81		-		NA
Olivetti (U.S. Only)	S-6000	Olivetti		19	35	01/82	0	0	0	NA
Norfield Datasystems, Inc.*	Nova System	Nova		35	50	06/73	20	0	20	X
Novell Data Systems, Inc.	Nexus I	Nexus		12	12	04/81	150	25	175	NA
OSM Computer Corporation	Zeus II	Z80		6	23	03/82	0	0	0	NA
Plessy Peripheral Systems	SBC 200 Series	LSI 11/23		26	34	11/81	0	40	40	540
Prodigy Systems, Inc.	Prodigy 1	Z80-A		10	15	05/79	265	35	300	NA
	Prodigy 2	Z80-A		13	18	06/80				NA
Programmed Control Corporation	Prophet 21/1	TI 960-B		42	75	--/72	40	0	40	1
	Prophet 21/2	TI 990/10		57	100	01/78	73	2	75	22
						TOTAL	113	2	115	23
Q1 Corporation	Q1/LMC	Z80, 8080		10	21	02/74	580	75	655	NA
	Q1/Lite	Z80		6	24	02/77	610	425	1,035	NA
	Q1 Microlite	Z80		10	13	01/79	222	323	545	NA
	Q1 68000	68000		NA	NA	05/82	0	0	0	NA
						TOTAL	1,412	823	2,235	
Qantel	210, 110	Q29		12	17	11/77	215	690	905	10
	800, 900	Q7		28	29	05/75	85	62	147	X
	950	Q7		28	33	11/75	600	240	840	X
	960	Q7.5		30	35	11/76	300	100	400	X
	970	Q29B		36	40	01/79	250	150	400	X
	1200	Q7		42	59	11/75	200	20	220	X
	1300	Q7.5		42	59	11/75	40	15	55	X
	1400-2	Q7.5		44	70	05/77	360	170	530	X
	1450-2	Q29B		45	80	01/79	200	50	250	X
	200 Series	Q29B		30	57	03/80	1,089	654	1,743	1,300
	300 Series	Q29B		50	80	03/80	291	57	348	250
	20 Series	Q29B		23	30	11/81	45	30	75	600
						TOTAL	3,675	2,238	5,913	2,150
Quodata Corporation	F-250, 500	PDP-8		15	30	--/72				X
	F-660, 760	PDP-11		44	100	--/75				X
	820, 960									
	Q-620, 650	PDP-11, 34, 44		40	120	--/80	296	60	356	50
	720, 750	VAX								
	820, 850, 880									
	950, 980									
	QDP/78	PDP-8		13	13	--/77				X
	ECS/7800	PDP-8		10	11	--/77				X
Quota	900 Series	8085, 8086, 8088		15	18	01/82	0	0	0	150

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Name of Manufacturer	Computer Model	Processor Model	Notes	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Randal Data Systems*	R-100 Series	Randal		14	17	10/75	257	13	270	X
	R-200 Series	Randal		24	30	10/76	382	0	382	X
	R-300 Series	Nova 2/10		34	45	06/74				X
	R-400 Series	Nova 2/10		36	45	06/74	27	0	27	X
	R-500 Series	Randal		42	47	10/77	45	0	45	X
						TOTAL	711	13	724	
Retail Sciences, Inc.	Clerk 700	PE 5/16		19	19	10/78	18	5	23	X
	Clerk 800	PE 5/16		25	25	04/79	25	15	40	X
						TOTAL	43	20	63	
Rexon Business Machines	RX15	8086		20	22	02/81	131	183	314	500
	RX20	8086		23	28	04/80	143	37	180	100
	RX30	8086		27	43	07/79	244	189	433	300
						TOTAL	518	409	927	900
Reynolds & Reynolds	VIM III	BTI 500		30	45	--/78	2,100	400	2,500	NA
	Expansion 6000	Z80		36	42	05/81	10	1	11	NA
						TOTAL	2,110	401	2,511	
R2E of America (U.S. Only)	XM	Z80		NA	20	03/82	0	-	0	NA
Sentinel Computer Corporation	Sentinel Ser.	8086		21	39	07/79	100	50	150	NA
A.O. Smith*	Mesa Two	Nova 3		58	58	05/77	10	0	10	X
Space Byte Computer*	DBM/1	8085		6	13	07/78	55	10	65	X
	DBM/2	Z80		13	15	06/79	10	0	10	X
						TOTAL	65	10	75	
Span Mangement Systems*	TSS2	IBM Series/1		31	31	--/77	10	3	13	X
Sperry Univac	BC-7	Univac		26	46	04/77	1,754	831	2,585	183
STC Systems, Inc.	2000	Nova 3/12		34	80	09/72	108	2	110	X
	3000	Nova 3D		55	90	11/75	72	2	74	X
	4000	Nova 4		45	65	11/77	60	0	60	5
	5000	Nova 4X		54	125	11/77	65	0	65	20
	6000	Nova 4X		108	225	10/82	0	0	0	2
						TOTAL	305	4	309	
Symcro Systems, Inc.	SB 700	Z80		19	30	04/81	3	0	3	30
Technico	TI32	TI9900		15	20	09/80	50	0	50	150
Tri-Star, Inc.*	TTK-10	Nova 3/12		45	55	02/76	12	0	12	X
	TEK-80	Nova		52	67	04/76	4	0	4	X
						TOTAL	16	0	16	
Ultimate Corporation	1000	LSI		29	35	--/82	0	0	0	NA
	2000	LSI		34	40	11/81	5	3	8	40
						TOTAL	5	3	8	40
Vanguard Computer Systems, Inc.	V400	Raytheon RDS 500		45	52	06/77	2	0	2	X
	V500	Raytheon RDS 500		65	85	03/76	6	3	9	NA
						TOTAL	8	3	11	
Wang	2200	2200		10	19	04/73	12,960	8,540	21,500	NA
	2200VP	2200VP		11	26	09/76	8,400	5,600	14,000	NA
	2200MVP	2200MVP		18	36	01/78				NA
	VS	2200VS		33	114	10/77	2,400	1,600	4,000	NA
	2200LVP	2200LVP		33	25	09/80				NA
	2200SVP	2200SVP		10	14	09/80	2,500	1,700	4,200	NA
						TOTAL	26,260	17,440	43,700	
Wintex Computer Corporation	200NS	Wintex		12	18	01/75	95	1	96	X
	MT 200	Wintex		10	20	10/79	160	0	160	100
	MT 86	Wintex		10	15	--/82	0	0	0	50
						TOTAL	255	1	256	150
Zilog	8000	Z8000		30	30	07/81	80	20	100	1,000
	MCZ 1/70	Z80		18	18	01/80	100	70	170	X
						TOTAL	180	90	270	1,000

	U.S.	International	World
TOTAL OF ABOVE	170,106	114,341	284,447
TOTAL OTHER VENDORS	2,500	600	3,100
TOTAL	172,606	114,911	287,547

Notes:

(a) Includes installations of Eldorado 140.
(b) Corporate name changed from Broadcast Management Concept, March 1, 1980.
(c) Used Microdata processors until 11/76.
(d) Includes retirements of Model B700.
(e) Corporate name changed from Warrex Computer Corporation when it was purchased by Electric Data Systems, January 29, 1981.
(f) Design Data was acquired by Data General in February 1977.
(g) Digital Computer Controls was acquired by Data General in early 1977.
(h) Marketed in the U.S. by Shasta General Systems.
(i) Rental price $3,000/month.
(j) Computer hardware division purchased from Pick and Associates during 1980.
(k) U.S. installation figures account for retirements.
(l) Northrop Data Systems was acquired by Kalbro Corporation in 1981.
(m) The average price during 1981 was $25K, but because of the weighted average, it appears lower.
(*) Not currently active in manufacturing or marketing small business computers.
(NA) Data is not available.
(X) Model not in new production.

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DESKTOP COMPUTER CENSUS

The Desktop Computer Census counts those computers which typically are small enough to be used on a desktop, and are found in a variety of end-user environments including business, home, hobby, personal, educational, and scientific. By IDC definition the Desktop Computer is microprocessor-based, includes its own power supply and enclosure, has the capability for attaching output peripherals -- video screen and/or printer -- and can also attach storage devices such as floppy diskettes, tape cassettes, or in some cases fixed disks. The computer is programmable in BASIC or equivalent level language, has a minimum of 4K RAM and costs from less than $1,000 up to $15,000 in a basic configuration. Microcomputer Boards and kits are not counted here.

DESKTOP CENSUS AS OF JANUARY 1, 1982

Name of Manufacturer	Computer Model	Processor Model	Notes	Purchase Price in Dollars Basic	Purchase Price in Dollars Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Advanced Micro Digital Corporation	Super/Net	Z80		875	875	01/82	0	0	0	5,000
Algorithmics, Inc.	Alga 2100	Z80		9,900	14,000	01/78	89	1	90	NA
Altos Computer Systems	ACS 8000-2	Z80		4,500	5,000	06/77				NA
	ACS 8000-5	Z80		5,990	7,000	10/79				NA
	ACS 8000-6	Z80		9,500	10,450	11/79	10,800	7,200	18,000	NA
	ACS 8000-10	Z80		8,500	8,500	05/81				NA
	ACS 8000-12	Z80		9,990	9,990	09/81				NA
	ACS 8000-14	Z80		11,990	11,990	09/81				NA
	ACS 8600-10	8086		10,500	10,500	05/82	0	0	0	NA
	ACS 8600-12	8086		12,500	12,500	02/82	0	0	0	NA
	ACS 8600-14	8086		14,500	14,500	05/82	0	0	0	NA
						TOTAL	10,800	7,200	18,000	
A.M. Jacquard	J500	A.M. Jacquard		12,000	16,000	12/78	970	1,020	1,990	100
APF Electronics	IM1	6800		400	1,115	11/79	14,000	0	14,000	NA
Apple	Apple II	6502		1,330	2,500	05/77	240,000	60,000	300,000	NA
	Apple III	6502		4,240	6,000	11/80	8,000	2,000	10,000	NA
						TOTAL	248,000	62,000	310,000	
Archives, Inc.	Archives Business Sys.	Z80		5,500	6,500	01/80	1,000	200	1,200	NA
Artec Electronics, Inc.	Artec Systems	8085 A-2		6,300	7,300	11/80	79	3	82	NA
Atari	400	6502		399	600	09/79	65,000	15,000	80,000	NA
	800	6502		899	1,100	09/79	30,000	6,000	36,000	NA
						TOTAL	95,000	21,000	116,000	
Basic Four	S10	Z80		5,995	5,995	3Q/82	0	0	0	NA
Billings Computer Co.	BC12FD	Z80		6,600	9,500	03/79	810	1,190	2,000	NA
	BC12DF2M	Z80		9,900	12,900	03/79				
BRD, Inc.*	Small Fry	6800		7,000	10,000	04/79	50	0	50	X
Canon (U.S. Only)	BX-3	6809		5,600	5,600	05/81	100	-	100	NA
	CX-1	6809		4,995	7,000	05/81	500	-	500	NA
						TOTAL	600	-	600	
Century Computer Corp.	Vanguard 800	8086		10,000	12,000	06/82	0	0	0	500
CIE Systems	680/10	68000		15,000	15,000	04/82	0	0	0	NA
Codata Systems Corp.	CTS-100	Z80A		7,392	9,937	06/80	300	0	300	700
	CTS-300	68000		11,405	13,950	06/81	1,000	0	1,000	1,000
						TOTAL	1,300	0	1,300	1,700
Columbia Data Products, Inc.	500	Dual Z80-A		3,000	3,995	09/79	500	52	552	700
	964	Dual Z80-A		3,197	4,995	09/79	256	78	334	700
	M64	Z80-A		1,405	2,249	12/79	258	44	302	500
	F64	Z80-A		2,877	4,495	02/80	35	21	56	150
						TOTAL	1,049	195	1,244	2,050
Commodore	PET/CBM	6502		995	1,295	10/77	100,000	145,000	245,000	NA
	VIC 20	6502A		299	400	06/81	20,000	30,000	50,000	NA
	Super Pet	6502B		1,995	1,995	07/81	9,000	11,000	20,000	NA
						TOTAL	129,000	186,000	315,000	
Compal	8100	8080		12,000	12,000	12/76	400	10	410	X
	8200	Z80		12,500	14,000	01/80	800	25	825	800
	EZ Type	Z80		8,995	9,995	03/81	50	0	50	100
						TOTAL	1,250	35	1,285	900
Compucorp	625	Z80		5,000	8,500	06/77	200	500	700	X
	655	Z80		4,000	6,500	04/79	2,000	4,000	6,000	NA
	665	Z80		5,000	7,000	04/79	1,000	2,000	3,000	NA
	675	Z80		7,000	9,078	06/79	3,000	6,000	9,000	NA
	685	Z80		12,000	14,000	05/81	300	600	900	NA
						TOTAL	6,500	13,100	19,600	
Computer Data Systems*	Versatile 4	8085		3,800	4,500	11/77	700	150	850	X
	Versatile 3B	8085		4,900	5,500	11/77	250	50	300	X
						TOTAL	950	200	1,150	

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Name of Manufacturer	Computer Model	Processor Model	Notes	Purchase Price in Dollars Basic	Purchase Price in Dollars Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Computer Hardware, Inc.	4800	CHI	a	8,850	10,500	04/81	5	0	5	NA
Computer Interface Tech.	Pense System	Micro-engine		5,295	8,000	11/79	400	355	755	NA
Computhink, Inc.	Minimax	6502		6,950	6,950	01/80	250	650	900	NA
	Eagle 32	68000		7,950	9,000	02/82	0	0	0	NA
						TOTAL	250	650	900	
Convergent Technologies	AWS	8088		5,795	6,795	11/81	400	100	500	NA
	IWS	8086		8,400	16,000	10/80	1,600	400	2,000	NA
						TOTAL	2,000	500	2,500	
Cromemco	System Zero/D	Z80-A		2,995	4,990	12/80	3,000	1,500	4,500	NA
	System Zero	Z80-A		995	2,990	12/80	1,000	400	1,400	NA
	System One	Z80-A		3,995	7,585	12/81	500	200	700	NA
	System Three	Z80-A		5,995	10,943	08/77	8,000	4,000	12,000	NA
						TOTAL	12,500	6,100	18,600	
Cyber Systems, Inc.	CYKEY 9910	Z80		7,000	9,000	06/81	15	0	15	450
Datamac Computer Sys.	1200 Series	Z80		2,295	4,195	07/81	100	0	100	1,000
Data Technology Ind.	System 10	Z80		3,950	3,950	01/80	400	850	1,250	4,500
Digilog Business Sys.	1000	Z80-A		3,995	6,495	11/80	950	50	1,000	NA
	1500	Z80-A		8,795	8,795	07/81	110	15	125	NA
	1800	Z80-A		9,795	9,795	03/82	0	0	0	400
	2000	Dual Z80-A		8,400	8,400	09/80	200	0	200	X
						TOTAL	1,260	65	1,325	
Digilog, Inc.	7120	Dual Z80-A		8,400	8,400	03/79	0	1,500	1,500	X
	7130	Dual Z80-A		10,500	10,500	07/81	0	200	200	2,000
						TOTAL	0	1,700	1,700	2,000
Digital Equipment Corporation	Mini MINC	LSI-11		9,900	11,000	10/79	4,500	600	5,100	3,000
	Data Sys. 150	LSI-11		10,900	15,000	03/79	1,200	900	2,100	X
	VT100	Z80(18XKit)		5,000	5,000	01/82	0	0	0	NA
						TOTAL	5,700	1,500	7,200	3,000
Digital Microsystems	DSC-2	Z80-A		4,995	5,895	11/77	5,140	2,210	7,350	80
	DSC-2585	Z80-A		9,950	9,950	06/78	300	0	300	X
	DSC-3	Z80-A		5,495	15,000	11/80	515	735	1,250	3,000
	DSC-4	Z80-A		6,950	10,000	10/80	110	135	245	500
	DSC-3F	Z80-A		3,995	3,995	04/82	0	0	0	1,500
						TOTAL	6,065	3,080	9,145	5,080
Durango Systems	F85	8085		9,950	12,536	10/78	1,875	1,875	3,750	1,600
	800 Series	8085		8,450	9,950	03/82	0	0	0	NA
	900 Series	8085		9,950	12,950	03/82	0	0	0	NA
						TOTAL	1,875	1,875	3,750	
Dynabyte	5200	Z80		4,495	5,000	--/78	1,500	700	2,200	100
	5300, 5305	Z80		4,995	7,000	--/79	900	600	1,500	500
	5400	Z80		6,995	8,500	--/79	450	250	700	X
	5800	Z80		17,995	23,000	--/80	125	75	200	X
	5900	Z80		18,995	25,000	--/80	175	100	275	X
	5505	Z80		6,995	10,000	--/81	600	500	1,100	1,700
	5605	Z80		7,295	11,000	--/81	600	400	1,000	2,500
	5710	Z80		8,995	13,000	--/81	500	300	800	2,000
						TOTAL	4,850	2,925	7,775	6,800
Exidy Systems, Inc.	Sorcerer	Z80		1,495	2,890	08/78				
	80/1	Z80		1,495	5,500	03/80	10,000	10,000	20,000	10,000
	80/2	Z80		1,495	7,295	03/80				
Findex, Inc.	100	Z80		4,500	5,980	07/79	24	6	30	X
	128	Z80		8,230	8,980	--/80	0	1	1	0
	234	Z80		6,980	8,500	01/81	195	625	820	NA
						TOTAL	219	632	851	
Fortune Systems Corp.	32:16	68000		4,995	7,000	04/82	0	0	0	16,000
Franklin Computer	ACE 100	6502		1,595	2,400	03/82	0	0	0	15,000
General Robotics*	Polaris	LSI-11		13,000	13,000	04/78	0	100	100	X
Gnat Computers, Inc.	System 10	Z80-A, 8085		4,650	6,100	12/79	150	50	200	
	System 10M	Z80-A, 8085		5,450	7,000	10/80	80	20	100	2,000
	System 10H	Z80-A, 8085		8,350	8,350	07/81	5	0	5	
						TOTAL	235	70	305	
Grid Systems	Compass Computer	8086		8,100	8,100	09/82	0	0	0	NA
Hardy Computer Corp.	8001	8086		6,900	10,000	07/81	43	7	50	NA
	801	Z80-A		1,350	3,000	06/80	350	150	500	NA
						TOTAL	393	157	550	

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Name of Manufacturer	Computer Model	Processor Model	Notes	Purchase Price in Dollars Basic	Purchase Price in Dollars Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Hewlett-Packard	9825	HP		5,900	10,900	01/76	11,170	19,130	30,300	400
	9826A	68000		8,950	12,700	06/81	1,171	1,529	2,700	3,550
	9830	HP		4,900	16,500	11/72	5,000	5,000	10,000	X
	9835	HP		9,000	13,200	12/78	3,250	4,100	7,350	NA
	9836	68000		11,950	15,750	01/82	0	0	0	3,800
	9845	HP		12,000	28,800	11/77	5,700	8,300	14,000	NA
	83	HP		2,250	2,550	01/81	2,000	2,000	4,000	NA
	85	HP		2,750	3,550	01/80	19,000	20,000	39,000	NA
	87	HP		2,495	4,790	03/82	0	0	0	NA
	125	HP		4,950	6,200	09/81	1,155	495	1,650	NA
						TOTAL	48,446	60,554	109,000	
IMSAI*	VDP-40	8085		5,300	5,300	--/78	380	20	400	X
	VDP-80	8085		7,800	7,800	--/77	670	130	800	X
						TOTAL	1,050	150	1,200	
Industrial Microsystems	5000	8080, Z80		3,495	5,300	06/79	2,000	1,000	3,000	5,800
	8000	8080, Z80		4,495	7,500	06/79	3,500	3,300	6,800	10,000
						TOTAL	5,500	4,300	9,800	15,800
Information Support Systems, Inc.	Voyager I	8085		4,995	4,995	04/81	48	0	48	X
	Voyager II	8085		9,995	9,995	04/81	48	0	48	NA
	Voyager III	8085		9,990	9,990	2Q/82	0	0	0	NA
						TOTAL	96	0	96	
Integrated Business Computers	IBC	Z80-A		9,000	13,000	--/80	200	300	500	X
	Cadet	Z80-B		10,000	15,000	07/81	200	300	500	500
	Ensign	68000		10,000	15,000	3Q/82	0	0	0	100
						TOTAL	400	600	1,000	600
IBM	5100	IBM		6,300	13,000	11/75	4,300	1,000	5,300	X
	5110	IBM		9,900	17,000	02/78	13,500	2,600	16,100	X
	5120	IBM		9,340	15,000	02/80	6,500	1,600	8,100	X
	5150 (Personal Computer)	8088		1,565	5,055	10/81	34,900	100	35,000	NA
	Sys/23 Datamaster	8085		9,830	12,530	07/81	3,700	1,300	5,000	NA
						TOTAL	62,900	6,600	69,500	
Intertec Data Systems	Super Brain	Z80-A		2,995	2,995	10/79	13,650	8,050	21,700	NA
	Super Brain QD	Z80-A		3,995	3,995	04/80				NA
	Compustar	Z80-A		2,500	3,500	01/81	2,600	1,800	4,400	NA
						TOTAL	16,250	9,850	26,100	
Konix International Corporation	System 80	Z80		3,700	4,000	06/78	53	14	67	X
	System 81	Z80		3,700	4,100	01/80	18	1	19	X
						TOTAL	71	15	86	
Lanier	Computer EZE	Z80		7,495	9,200	07/81	450	0	450	NA
M/A-Com Office Sys.	Challenger	6502/6800	b	1,260	4,500	--/78	6,450	650	7,100	NA
Micro Expander	Expander	Z80		2,200	4,250	11/81	60	40	100	7,500
Micro V Corp.	Microstar I	8085A		7,500	15,000	08/78	1,750	1,750	3,500	NA
	Microstar II	8086		12,000	25,000	09/80				NA
	Series 3000	8086		15,500	24,000	05/81				NA
Micromation	M/SYSTEM	Z80-A		3,500	8,300	01/80	2,000	3,000	5,000	NA
Monroe Systems for Business	OC8820	Z80-A		4,385	4,385	12/81	300	100	400	NA
	EC8800	Z80		3,295	3,295	12/81	300	100	400	NA
						TOTAL	600	200	800	
Morrow Designs	Decision 1	Z80		5,000	7,000	04/81	100	40	140	NA
MultiTech Systems	MT 500	Z80		4,795	4,995	12/81	9	0	9	250
NCR	7500, 7900	NCR		7,500	9,500	--/79	1,600	3,200	4,800	NA
	Multivision	8085-A		3,700	12,800	12/80	450	450	900	NA
						TOTAL	2,050	3,650	5,700	
NEC Information Systems (U.S. Only)	205	NEC		6,500	11,039	07/80	580	-	580	NA
	PC 8000	NEC		995	2,300	05/81	14,000	-	14,000	NA
						TOTAL	14,580	-	14,580	
NNC Electronics	80	Z80		4,850	4,583	02/80	200	100	300	200
	80W	Z80		8,750	8,640	11/80	200	100	300	200
						TOTAL	400	200	600	400
North Atlantic Ind.	SBC-1 Shoebox	LSI 11/2		1,980	1,980	01/81	100	0	100	NA
North Star Computers	Horizon	Z80-A		3,945	3,909	12/77	24,000	6,500	30,500	NA
	Advantage	Z80-A		3,995	4,295	09/81	2,500	500	3,000	NA
						TOTAL	26,500	7,000	33,500	

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Name of Manufacturer	Computer Model	Processor Model	Notes	Purchase Price in Dollars Basic	Purchase Price in Dollars Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Northwest Micro-computers*	IVMS 85/P	8085		7,200	7,200	01/78	25	3	28	X
Odell Ind.*	System 85	8085A		10,450	15,550	06/78	30	0	30	X
Olivetti	P-6060	Olivetti		13,000	13,000	--/77	1,000	-	1,000	X
(U.S. Only)	P-6066	Olivetti		11,600	11,600	03/81	600	-	600	NA
						TOTAL	1,600	-	1,600	
Onyx Systems, Inc.	Sundance	Z80-A		8,495	9,000	06/81	400	200	600	1,200
	C5001/MU	Z80-A		8,400	9,000	04/81	600	300	900	1,300
	C8001/MU	Z80		10,500	11,000	10/80	1,000	700	1,700	1,800
						TOTAL	2,000	1,200	3,200	4,300
Osborne Computer Co.	Osborne 1	Z80		1,795	1,795	07/81	6,700	300	7,000	NA
Otrona Corp.	Attache	Z80-A		3,995	3,995	03/82	0	0	0	NA
Panasonic Co.	JD 850	8085		10,500	11,500	06/80	20	-	20	NA
(U.S. Only)	JD 740	8085		7,000	9,500	10/81	5	-	5	NA
	JD 800	8085		8,000	9,000	--/82	0	-	0	NA
						TOTAL	25	-	25	
Pentel of America, Ltd. (U.S. Only)	Penputer PS-850	Z80		13,000	13,000	2Q/82	0	-	0	NA
Pertec Computer Corp.	PCC 2000	8085A		9,995	13,120	09/78	1,469	1,565	3,034	NA
	MITS 300/25/55	8080		8,080	13,800	--/77	1,100	175	1,275	X
						TOTAL	2,569	1,740	4,309	
Polymorphic Systems	8813	8080		4,700	5,801	09/77	2,650	500	3,150	
	Twin Systems	8080		6,000	7,500	07/78	90	85	175	500
	88HD	8080		10,000	15,000	03/81	50	75	125	
						TOTAL	2,790	660	3,450	500
Processor Industry*	Sol I, II, III, IV	8080A		3,000	6,000	--/77	4,500	500	5,000	X
Psytek, Inc.	Psytek 770	Z80		4,750	7,200	07/79	30	5	35	X
Quay Corp.	Quay 900, 900M, 900/33	Z80		4,995	8,000	09/79				NA
	Quay 500	Z80		2,495	2,700	03/80	800	200	1,000	NA
	Quay 520	Z80		2,995	3,200	03/80				NA
	Quay 540	Z80		3,745	3,745	01/82	0	0	0	NA
	Quay 910	Z80		7,995	7,995	03/82	0	0	0	NA
						TOTAL	800	200	1,000	
R2E of America (U.S. Only)	X Product	Z80		8,500	8,500	01/79	250	-	250	NA
Rair Microcomputer Corp.	Black Box 3/20, 30, 50	8085		6,500	6,500	05/81	250	1,495	1,745	3,900
Retail Sciences	Clerk 300	Z80		12,000	12,000	08/79	85	50	135	X
Sanyo	MBC-2000	8085		3,495	3,495	05/82	0	-	0	NA
(U.S. Only)	MBC-3000	8085		6,495	6,495	06/82	0	-	0	NA
	MBC-1000	8085		1,995	1,995	05/82	0	-	0	NA
						TOTAL	0	-	0	
Scientific Data Sys., Inc.	SDS 420 Series	6502		5,500	8,400	03/79	467	30	497	800
	SDS 4000	6502		7,400	7,400	07/82	0	0	0	300
						TOTAL	467	30	497	1,100
S. D. Systems	SD 100	Z80		6,995	6,995	04/78	200	65	265	X
	SD 200	Z80		9,700	10,001	05/77	345	110	455	NA
	SD 700	Z80		19,500	20,684	09/80	70	25	95	NA
	SD 610	Z80		14,000	14,500	02/81	95	40	135	NA
	MS 200	Z80		6,495	7,500	02/81	50	20	70	NA
	MS 610	Z80		9,995	11,000	12/81	10	5	15	NA
	WS 800	Z80		2,495	3,500	02/82	0	0	0	NA
						TOTAL	770	265	1,035	
Sharp Electronics Corp.	YX-3200-100	Z80-A		4,495	5,000	05/81	200	0	200	NA
(U.S. Only)	YX-3200-200	Z80-A		6,525	7,000	01/82	0	0	0	NA
						TOTAL	200	0	200	
Smoke Signal Broadcasting	Chieftan	6800		2,595	3,000	03/79	500	135	635	50
	Chieftan	6809		2,695	3,100	03/80	650	275	925	500
						TOTAL	1,150	410	1,560	550
Solid State Technology	8185	8085A		6,000	10,000	12/79	150	25	175	200
Systel Computers, Inc.	Model 11	8085, Z80		8,950	8,950	01/81	50	200	250	X
	Model 15	8085, Z80		9,950	9,950	01/81				X

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Tandy/Radio Shack	TRS-80/I	Z80		499	1,000	09/77	247,500	27,500	275,000	NA
	TRS-80/II	Z80		3,450	6,500	07/79	72,000	8,000	80,000	NA
	TRS-80/III	Z80		700	2,000	09/81	34,000	4,000	38,000	NA
	TRS-80 Color	Z80		399	399	09/81	11,000	1,000	12,000	NA
	TRS-80/16	68000		4,999	9,000	--/82	0	0	0	NA
						TOTAL	364,500	40,500	405,000	
Tano Corp.	Outpost II	6800		4,995	5,575	08/78	1,050	130	1,180	NA
	Outpost 7	6800		3,000	4,000	08/77	180	20	200	X
						TOTAL	1,230	150	1,380	
Tektronix	4051	6800		5,995	12,500	12/75	9,060	4,840	13,900	NA
	4052	Tek		9,950	16,500	07/79	2,870	1,430	4,300	NA
	4054	Tek		20,100	22,500	07/79				NA
						TOTAL	11,930	6,270	18,200	
Televideo Systems, Inc.	TS 801	Z80		3,295	3,295	09/81	537	134	671	340
	TS 816	Z80		12,995	12,995	02/82	0	0	0	1,700
	TS 800A	Z80		1,695	1,695	09/81	1,018	255	1,273	13,000
	TS 802	Z80		3,495	3,495	12/81	56	13	69	6,900
	TS 802H	Z80		6,995	6,995	12/81	27	6	33	3,600
	TS 806	Z80		7,195	7,195	09/81	550	137	687	4,000
						TOTAL	2,188	545	2,733	29,540
Texas Instruments	99/4	TI9900		650	1,000	11/79	19,850	150	20,000	NA
	99/4A	TI9900		450	450	07/81	29,700	300	30,000	NA
						TOTAL	49,550	450	50,000	
Toshiba America (U.S. Only)	T-200	8085		3,750	5,500	08/81	200	-	200	NA
	T-250	8085		4,750	7,000	08/81	300	-	300	NA
						TOTAL	500	-	500	
Vector Graphics	System B, MZ	Z80		4,313	5,400	01/79				
	1600	Z80		3,995	3,995	08/80	10,921	2,814	13,735	NA
	2800	Z80		7,295	7,295	07/80				
	2600	Z80		5,195	5,195	03/81				
	3100	Z80-B		5,795	5,795	07/81				
	3105	Z80-B		8,495	8,495	07/81	1,118	182	1,300	NA
	3032	Z80-B		12,795	12,795	05/81				
	5032	Z80-B		13,995	13,995	02/82	0	0	0	NA
	5005	Z80-B		8,995	8,995	05/81	258	42	300	NA
	Memowrite	Z80		8,950	8,950	01/79	300	100	400	X
						TOTAL	12,597	3,138	15,735	
Victor Business Prod.	Victor 9000	8088		4,995	8,000	04/82	0	0	0	NA
Wang Laboratory	PCS 1	Wang 2200		5,400	8,000	04/76	840	320	1,160	X
	PCS 2	Wang 2200		4,800	10,145	04/77	3,045	1,960	5,005	X
	PCS 3	Wang 2200		6,500	9,000	04/80	25	10	35	NA
						TOTAL	3,910	2,290	6,200	
Wave Mate	Series 2000	6800		2,395	3,000	01/79	100	100	200	NA
Wicat	System 150	68000		8,500	8,500	10/81	125	25	150	225
	System 150-3WS	68000		10,850	10,850	04/82	0	0	0	1,250
						TOTAL	125	25	150	1,475
Xerox	510	8085A	c	15,000	17,000	09/79	1,500	2,500	4,000	NA
	515	8085A		5,700	6,300	03/81	400	2,000	2,400	NA
	820	Z80		2,995	4,995	06/81	10,000	2,000	12,000	NA
						TOTAL	11,900	6,500	18,400	
Zeda Computers Int'l	Zeda 580	Z80		6,038	6,250	06/79	500	250	750	NA
	Zeda 520	Z80		3,995	3,995	02/81	50	0	50	NA
						TOTAL	550	250	800	
Zenith	Z89	Z80		2,595	5,000	10/79	15,750	15,750	31,500	NA
	Z90	Z80		2,895	5,000	10/81				
Zilog	MCZ 1	Z80		8,000	9,500	--/77	1,750	1,550	3,300	NA
	MCZ 2	Z80		11,500	11,500	06/80	650	550	1,200	NA
						TOTAL	2,400	2,100	4,500	

	U.S.	International	World
TOTAL OF ABOVE	1,249,147	506,453	1,755,600
TOTAL OTHER VENDORS	5,450	1,250	6,700
TOTAL	1,254,597	507,703	1,762,300

NOTES:
a Corporate name was changed from Business Machines.
b Corporate name was changed from Ohio Scientific when it was acquired by M/A-Com Office Systems, Inc., 12/80.
c Xerox sells the 510 model in addition through Diablo under the Model 3000 name; however, the whole installed base is credited to Xerox.
* Not currently active in manufacturing or marketing desktop computers.
NA Data is not available.
X Model not in new production.

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REVIEW & FORECAST
Part II

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

MOLLY UPTON, EDITOR SEPTEMBER 22, 1982 ● VOL. 18, NO. 10, 11 P.J. MCGOVERN, PUBLISHER

1982 COMPUTER SHIPMENTS HOLD FIRM DESPITE RECESSION; VALUE TO RISE 15% TO $33.9 BILLION

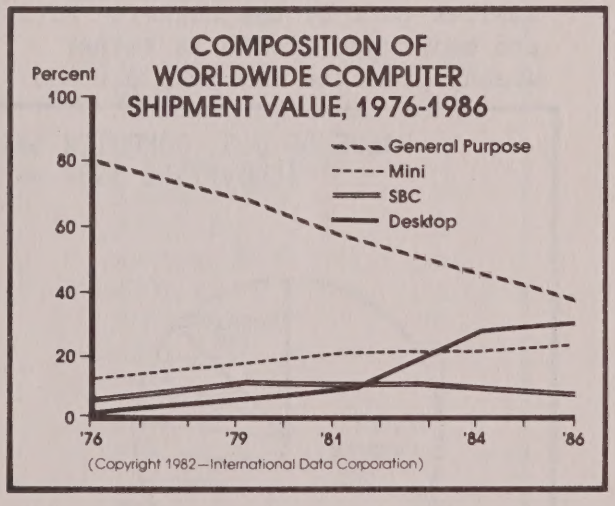
Despite a prolonged worldwide recession, the information processing industry continues to rack up impressive annual growth. Although there are several soft spots in the picture, International Data Corp., publisher of EDP/IR, forecasts substantial increases for all processor markets through 1986.

In 1981, U.S.-based manufacturers enjoyed a 52% growth in worldwide processor unit shipments. The total value of the 1,040,000 units shipped reached $29.4 billion, up 13% over 1980. Much of the action was at the low end, as desktop computers and 4300 sales were particularly strong.

Even though 1982 promises to be one of the economy's worst years since the Depression, users continue to show an almost insatiable demand for processing power. Strong sales of IBM's 3081s will be enough to prop up an otherwise flat general purpose market, while desktop computers and superminis continue to carry the sales of smaller systems.

From a global perspective, the U.S. market continues to pull away from the rest of the world. IDC expects that the value of shipments by U.S. manufacturers will grow at 18% per year in the U.S. compared to 14% internationally, as the U.S. market increases its share from 58% in 1981 to 63% in 1986.

The chart opposite shows how different the processor market will look by 1986. Mainframes, which accounted for 81% of the value of the 1976 worldwide processor market, will see their share fall to 40% by 1986, while desktops will rise from a mere 10% in 1981 to 29% by 1986. In fact, desktop computer shipments will pass those for minis in 1983, even though the overall share of minis will continue to rise.



EDP Industry Report is published in annual volumes of twenty-four issues each by International Data Corporation, Post Office Box 955, Five Speen Street, Framingham, MA 01701. Entire contents ©1982 by International Data Corporation. **Editor,** Molly Upton; **Managing Editor,** David Moschella; **Census Editor,** Lloyd Cohen; **Contributing Editors,** John Dix, John Gantz, Aaron Goldberg, Jack Hart, David Terrie, William F. Zachmann; **Circulation Manager,** Mary M. Trayte. Patrick J. McGovern, Chairman, International Data Group. John P. Breyer, President, International Data Corporation. Editorial ideas and information are researched and formulated by the editorial staff. Information and opinions in each issue are based on the best information available, but their accuracy and completeness cannot be guaranteed. **Subscriptions:** One year, $325; two years $585. Single copies priced as indicated on inside pages. Prices for multiple copies on request. Reproduction without written permission is completely forbidden. Telex 95-1168; Telephone **617/872-8200.**

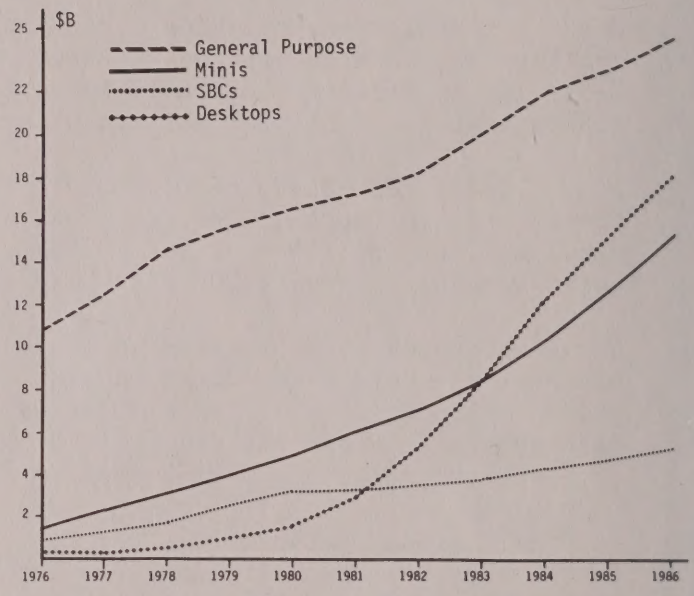
VALUE OF WORLDWIDE COMPUTER SHIPMENTS, U.S.-BASED MANUFACTURERS, 1981-1986
(Copyright 1982 -- International Data Corporation)

	1981 Worldwide Shipments ($M)	1986 Worldwide Shipments ($M)	Compound Annual Growth Rate
Mainframes	$17,360	$24,700	7.3%
Minis	6,180	15,355	20.0
SBCs	2,845	4,030	7.2
Desktops	3,006	18,286	43.5
Total	29,391	62,371	16.2

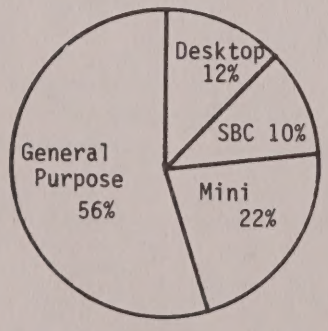
The chart on the right shows the steady progress of desktop computers, catching Small Business Computers (SBCs) in 1981, minis in 1983, and now taking aim on the mainframe market. In fact, IDC's aggressive desktop computer forecast sees the value of U.S. desktop shipments passing that for U.S. general-purpose computers by 1986 (see pie chart below.) In terms of units, by 1986 desktop computers will account for 93% of all worldwide shipments, up from 79% in 1981.

As the curves show, desktop computer success will come at the expense of SBCs, which like mainframes are steadily becoming a smaller part of the market. Mini and mainframe growth is rather steady over the ten year period.

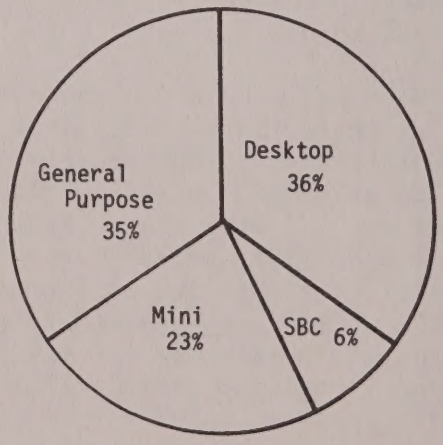
VALUE OF WORLDWIDE SHIPMENTS, 1976-1986
(Copyright 1982 -- Int'l. Data Corp.)



VALUE OF U.S. COMPUTER SHIPMENTS, U.S. MANUFACTURERS, 1981-1986*
(Copyright 1982 -- International Data Corporation)



1981
$17,095M



1986
$39,113M

* The value of minis used in SBCs has been subtracted from SBCs to avoid double counting.

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Mainframes resilient

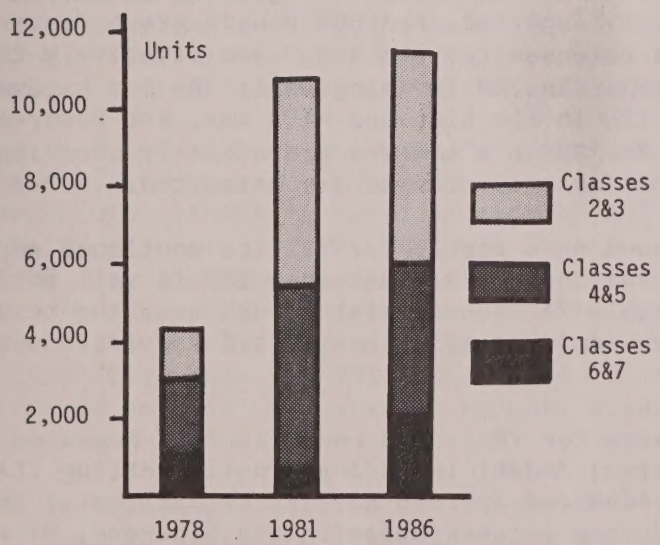
In 1981, shipments of low-end System/38s and Univac System 80s gave size class two a slight unit increase, but the market will remain sluggish until IBM introduces a follow-on for its large System/3 base. Size class three was down a bit as 4331-1 sales passed their peak, while 4331-2 and 4341-1 sales picked up, providing size class four with a comfortable gain. Thanks to strong shipments of the 4341-2, class five showed its first big year since the 370 era.

1981 was not a good year for size classes six and seven. Despite enticing price cuts, users were delaying 3033 purchases in anticipation of the 3081s and IBM did not really have much in class six other than the 3033S as a short-term filler. Non-IBM mainframers were similarly caught between product cycles. Consequently, class six and seven units and value were down from 1980 levels.

This situation will turn around in 1982 and beyond. In light of the economy, IBM is enjoying remarkable success with its 3081 line. Pent up demand for MIPS (Million Instructions Per Second) has put IBM in the enviable position of being able to ship all the big systems it can build, and IBM says it is making more than even it expected; 1982 shipments in the U.S. could exceed 500.

In 1982, IBM had to carry the ball alone, but in 1983 and beyond, new Univac and CDC lines will be in full swing and Burroughs and Honeywell will probably be joining them. In addition, shipments of IBM's 3083 series will begin in 1983, giving a big boost to size class six shipments. In fact, EDP/IR believes that because users can easily and economically upgrade from 3083s to 3081s, size class six will gather many of the 1983 and 1984 large system shipments, with many of these users migrating into class seven systems in 1985 and 1986.

U.S. GENERAL PURPOSE SHIPMENTS BY SIZE CLASS, 1978-1986
(Copyright 1982 -- International Data Corporation)



Size Classes for IBM CPUs

Model	Class
System/3-4,6,8	2
System/38-3	2
370/115	3
System/38-5	3
4331-1	3
370/138	4
4331-2	4
4341-1	4
370/148	5
4341-2	5
370/158	6
3031	6
3083	6
370/168	7
3033	7
3081	7

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INFORMATION PROCESSING REVENUES -- LEADING MANUFACTURERS ($M)
(Copyright 1982 -- International Data Corporation)

	1976	1977	1978	1979	1980	1981	Comp. Growth
IBM	13,400	14,765	17,074	18,338	21,367	24,073	12.4%
DEC (6/30)	736	1,059	1,437	1,804	2,368	3,198	34.2
CDC	1,358	1,513	1,868	2,273	2,791	3,101	18.0
NCR	1,674	1,944	2,240	2,634	2,951	3,072	12.9
Univac (3/31)	1,467	1,726	2,050	2,319	2,707	2,831	14.1
Burroughs	1,612	1,794	2,083	2,376	2,413	2,718	12.6
HIS	914	1,037	1,294	1,453	1,634	1,774	14.2
HP	461	588	769	1,060	1,510	1,771	30.9
Total	21,622	24,426	28,815	32,257	37,741	42,538	14.5

In 1981, Digital Equipment Corp.'s consistent 34% growth rate finally tracked down the members of the BUNCH (Burroughs, Univac, NCR, CDC, Honeywell). DEC vaulted from sixth place in 1980 to second in 1981, and since the minicomputer colossus shows few signs of slowing down, it will leave the non-IBM mainframers in the dust over the next few years. In fact, in 1982, Hewlett-Packard will shoot past Honeywell into seventh position. Lest any need a reminder of IBM's size, consider that at its average 12.4% growth rate, Big Blue adds nearly the size of a DEC to itself every year.

1981 and 1982 have seen a steady stream of questioning over the BUNCH's future, as the group has been slow to move into new, fast growing markets. Yet the data shows that over the 1976-1981 period, the BUNCH have grown faster than IBM. This will change in 1982 as revenues for the BUNCH are relatively flat and earnings are generally down, whereas IBM is doing well. As for hardware, Univac and CDC will compete with IBM in the high-end MIPS war, but Honeywell and Burroughs aren't committed. The BUNCH's members are steadily evolving new, more specialized strategies matched to their respective strengths.

The next few years should be good ones for IBM. With its continued emphasis on purchase and its desire to pursue any and all markets, IBM is well positioned to ride its 308X product cycle for substantial growth over the next few years, especially since the Reagan administration has lifted the antitrust monkey off IBM's back.

1981 and 1982 have been off years for IBM's PCM competitors. Magnuson is in financial and managerial disarray; Amdahl is having trouble getting its 5860s out the door; and National Advanced Systems may yet be implicated in the "Japanscam" scandal. NAS has had some success shipping its high-end, Hitachi-built 9000 series, and will probably join Amdahl in the PCM peripheral business. In June, IBM said it had delivered some 1,500 of its 3380 drives since October 1981, but it alone can't meet the full demand, and there is opportunity for anyone who can get a reliable 3380-compatible drive out on the market.

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WORLDWIDE NEW-BUILT SHIPMENTS, GENERAL-PURPOSE COMPUTERS
U.S. BASED MANUFACTURERS, 1979-1981
(Copyright 1982, International Data Corporation)

	1981			1980			1979	
	$M	% Total	%Δ	$M	% Total	%Δ	$M	% Total
IBM	10,920	62.9	7.3	10,180	61.2	3.6	9,825	62.3
Amdahl	350	2.0	-7.9	380	2.3	4.1	365	2.3
National	205	1.2	7.9	190	1.1	5.5	180	1.2
Magnuson	40	0.2	14.3	35	0.2	133.3	15	0.1
IPL	25	0.1	150.0	10	0.1	-	-	-
Cambex	*	-	-	-	-	-	-	-
Compatible Peripherals	1,015	5.9	45.0	700	4.2	9.4	640	4.0
Subtotal PCMs	1,635	13.0	24.3	1,315	11.4	9.6	1,200	10.9
TOTAL IBM BASE	12,555	72.3	9.2	11,495	69.1	4.3	11,025	69.8
HIS	1,220	8.3	-21.3	1,550	9.3	0.0	1,550	9.8
Sperry Univac	1,440	7.0	-1.7	1,465	8.8	-4.2	1,530	9.7
Burroughs	1,020	5.9	2.0	1,000	6.0	17.6	850	5.4
NCR	450	2.6	-6.2	480	2.9	23.1	390	2.5
CDC	390	2.3	-2.5	400	2.4	66.7	240	1.5
DEC	180	1.0	-12.2	205	1.2	36.7	150	1.0
Cray	105	0.6	110.0	50	0.3	11.1	45	0.3
Others	-	-	-	-	-	-	-	-
TOTAL NON-IBM BASE	4,805	27.7	-6.7	5,150	30.9	8.3	4,755	30.2
TOTAL	17,360	100.0	4.3	16,645	100.0	5.5	15,780	100.0

*Less than $2.5 million.

Changes in the mini market

1981 and early 1982 marked the beginning of several new directions for the minicomputer market. No less than Digital Equipment, Data General and Hewlett-Packard joined Prime in making major overtures to the office, while the major vendors recognized the importance of both personal computers and third-party software. Mini makers need new markets both to grow and to take advantage of the microprocessor technology which is driving the low end of the market.

Not that the outlook for today's mini market is all that gloomy. Led by superminis, the overall value of worldwide minicomputer shipments by U.S. manufacturers will grow at a compound rate of 20% over the 1981-1986 period, from $6.2 billion to $15.4 billion. Unit shipments will increase at a compound rate of 16.8% over the same period. In terms of the dollar value of worldwide shipments, the fastest growing sectors will be superminis (22%), traditional (17%), and microminis (16%). Even so, the value of worldwide desktop shipments will pass those for minis in 1983. No wonder DEC President Ken Olson called its new line of personal computers "the most significant products Digital has produced to date."

Due to both the recession and competition from desktops, worldwide micromini unit shipments decreased 12.2% in 1981, and will be relatively flat in 1982. Nevertheless the long-term outlook for microminis is bright, with IDC forecasting that overall unit shipments will increase at a compound rate of 18.4% through 1986, when microminis will be a $416 million market. OEMs continue to be the dominant marketing channel.

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Once the mainstay of the minicomputer industry, the traditional minicomputer market is now the slowest growing segment in terms of unit shipments. IDC expects that worldwide unit shipments of U.S. manufacturers will grow at just 13% through 1986. As with microminis, 1981 shipments actually declined, but traditionals will drop further in 1982. However, because of higher average system values and increasing software and services revenues, vendors should still enjoy significant overall growth.

EDP/IR believes that traditional mini growth will pick up as today's 16-bit systems move to a 32-bit architecture. The recent announcement of a low-end Vax is indicative of this new direction, but because it will take time to upgrade the software base, IDC does not see 32-bit systems having a significant impact on the traditional mini market until at least late 1983.

Shipments of 32-bit superminis, on the other hand, have carried much of the mini industry for the last few years and will continue to do so. Originally oriented toward the scientific/engineering customer, superminis are increassingly being used in commercial applications. This trend will continue as DEC, DG and others continue to offer more commercial software for their superminis.

In terms of worldwide unit shipments, superminis will grow at 21% per year, from 27,200 in 1981 to 70,800 in 1986. Perhaps more importantly, superminis will continue to increase their share of the value of minicomputer shipments from 63% today to 68% in 1986.

Because of its fast growth, the supermini market has attracted swarms of new competitors, including Stratus and Charles River Data. The market is getting crowded, and many vendors will either grab a special niche -- such as Stratus' redundancy -- or fall by the wayside.

WORLDWIDE MINICOMPUTER SHIPMENTS BY U.S.-BASED MANUFACTURERS, 1980-1981
(Copyright 1982 -- International Data Corporation)

	1980 $M Revenue	1981 $M Revenue	1981 % Share	1980 Units Shipped	1981 Units Shipped	1981 % Share
DEC	2,432	3,340	41.2%	77,560	73,080	49.0%
Hewlett-Packard	1,010	1,233	15.2	9,721	12,004	8.1
Data General	672	764	9.4	18,200	16,800	11.3
HIS	425	503	6.2	4,900	4,000	2.7
Texas Instruments	243	402	5.0	13,770	10,910	7.3
Prime	268	365	4.5	1,651	1,799	1.2
IBM	350	356	4.4	8,600	9,500	6.4
Tandem	129	243	3.0	748	1,401	1.0
Perkin Elmer	186	225	2.8	2,021	1,835	1.2
Sperry Univac	84	133	1.6	1,117	1,562	1.0
SEL	89	122	1.5	410	700	0.5
Modcomp	81	87	1.0	525	776	0.5
Harris	76	84	1.0	518	402	0.3
GAI	155	82	1.0	4,573	2,528	1.7
CAI	81	72	0.9	6,464	4,245	2.8
Others	149	105	1.3	5,222	7,458	5.0
TOTAL	6,430	8,116	100.0%	156,000	149,000	100.0%

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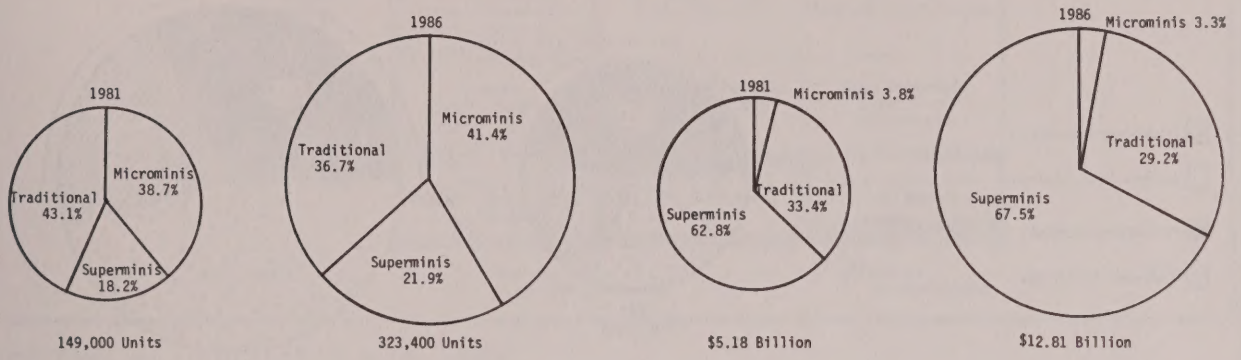
WORLDWIDE MINI PROCESSOR SHIPMENTS, U.S.-BASED MANUFACTURERS, 1981-1986
(Copyright 1982 -- International Data Corporation)



The figures above do not include add-on peripherals, and thus will not add to the total of mini shipments on the red page. The numbers show that the share of traditional minis will fall for both value and units, but the dollars will decline less, thanks to rising average system values. Average system values for superminis are also rising, while those for microminis are falling.

Processing terminals and DDP

Though processing terminals such as the IBM 8100 and the Datapoint 1800 are not included in IDC's processor forecasts, they are steadily becoming a major marketplace. 1981 shipments of clustered and single station processing terminals were valued at $1.4 billion and will grow at 22% through 1986 when they will reach $3.8 billion. Clustered systems continue to grow faster than single station models accounting for 78% of the units in 1981 and 81% in 1986.

Despite the fact that its 8100 should have been in a peak shipment year, IBM watched its 1981 market share drop from third to fourth place. Datapoint and Four Phase held their first and second positions, while Univac edged into third. Mohawk, Raytheon, Nixdorf, Pertec, Northern Telecom, and Harris round out the top ten.

The debate between the 8100 and the 4300 continues unresolved, although it seems that IBM is increasingly looking towards the 4300 as its low-end DDP node. Despite new, more powerful 8100s, acceptance is being retarded by the lack of available application software for the 8100 DPPX and DPCX operating systems. The 8100 has also been criticized on price/performance grounds and for lack of any kind of upgrade path. However, IDC user surveys indicate that many users are happy with their 8100s, and the machine does have some elegant communications features designed with SNA in mind.

As is the case with minicomputers and small business systems, multi-functionality is increasingly being expected of clustered processing systems. Word processing and electronic mail are becoming standard, and most major vendors have recognized the need to pay homage to the buzzword of office automation. Four-Phase, acquired in 1981 by Motorola, has been aggressive in this area using the IBM-compatible mainframes that came with its acquisition of Two Pi.

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MARKET SEGMENTATION OF WORLDWIDE VALUE-ADDED SERVICES MARKET, U.S.-BASED VENDORS, 1981-1986
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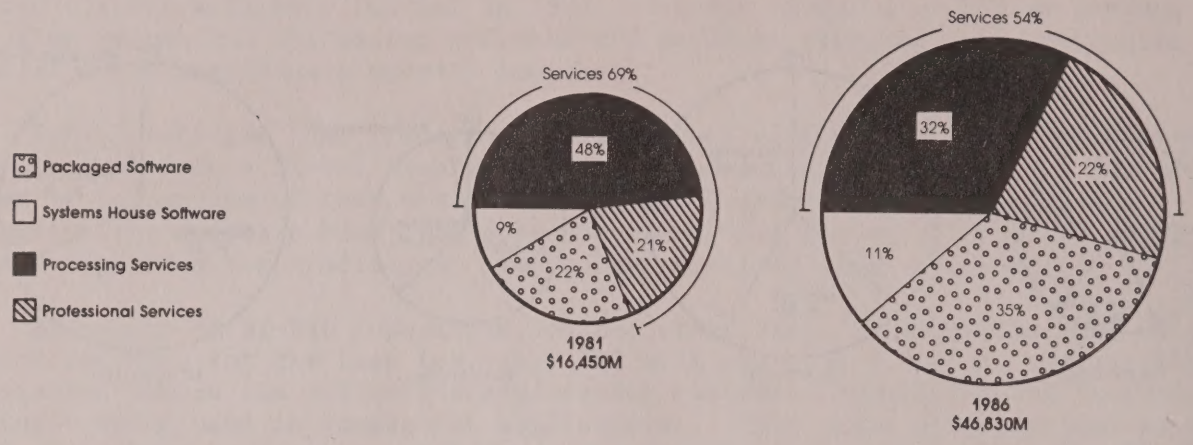

Software on the rise

Software continues to be the star of the value-added supplier portion of the marketplace, increasing its worldwide share from today's 22% to 35% by 1986. Revenues will grow at an impressive 36% through 1986. The picture is bright in all corners. New interest in operating systems, compilers, languages, communications, data base management, and larger addressing will be enough to keep system software stong at 31% per year, while the proliferation of desktop computers will give a boost to the already strong demand for packaged software.

Not surprisingly, software follows hardware and thus desktops are the fastest growing market for software, followed by minis/SBCs, and mainframes. But because of its market predominance, mainframe software accounted for 74% of 1981 software revenues, and the still nascent desktop market for just 4% of the 1981 total. Among some of the other driving forces:

- Application backlog. DP departments can't keep up with user demand, fueling packaged data base, desktop, and application software sales.
- Economics. The efficiency of internal development vs. outside purchase continues to tilt towards the latter.
- Joint marketing. Many major hardware vendors, including IBM and DEC, made formal efforts to improve their relations with independent software vendors. IBM's work with MSA typifies the giant's new attitude.
- Transportable systems. CP/M and UCSD-P for desktops and Unix for minis promise to improve software transportability, improving packaged software developmental economics.
- International successes. U.S. software is doing increasingly well in international markets.
- New markets. Graphics, artificial intelligence, CAD/CAM, sophisticated modeling and decision support software are expanding the value-added territory.

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PROCESSING SERVICES MATRIX, BY ACCESS METHOD AND APPLICATION
(Copyright 1982 -- International Data Corporation)

	Batch	Remote Batch	Interactive
Transaction Processing (Solutions)	Payroll Processing Accounts Receivable	Inventory Control Claims Processing	Invoicing Electronic Funds Transfer
Data Base Inquiry (Retrieval)	Business Credit Checking	Multiple Listing Services Library Cataloging Services	Stock Quotations Credit Card Authorization
Problem Solving (Tools)	Raw Computer Time Scientific/Engineering Applications	Raw Computer Time Scientific/Engineering Applications	Raw Computer Time Financial Modeling

Batch Remote Automated Transaction Remote Problem Solving

Services, an inevitable slow down?

The effects of the recession made 1981 a rather poor year for some, if not all of the processing services industry. Feast or famine tended to track the general economy with companies that serve automobile or real estate suffering, and those in insurance or banking holding up rather well. Hardest hit were the timesharing companies whose growth slowed from 24% in 1980 to 16% in 1981, as companies such as Tymshare experienced unaccustomed growing pains and lost some of their Wall Street luster.

SEGMENTATION WORLDWIDE PROCESSING SERVICES MARKET,
U.S.-BASED VENDORS 1981-1986
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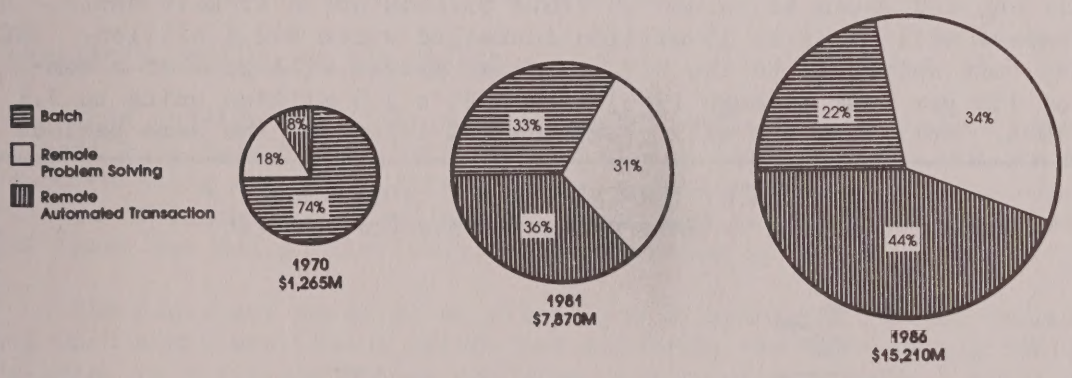

Today's technology is working against the shared hardware principle that has driven the processing services industry since its inception. Consequently, IDC believes that processing services will steadily decline as a percentage of the value-added pie, losing some three percent a year until 1986 when they will account for only about one-third of all value-added revenues.

Overall, the processing services industry is expected to grow at only 14% per year, from $7.9 billion today to $14.9 billion in 1986. Remote problem solving and remote autotransaction services will grow at 16% and 19% per year and batch will plug along at 5% per year. By 1986, autotransaction will control 44% of the market, followed by problem solving (34%), and batch (22%).

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If processing services vendors are to rekindle the growth of the past, they will have to pioneer new areas such as specialized data bases that feed into decision support systems, or complex inter- and intra-company transaction processing networks. In other words, they will have to emphasize shared software and data, staying one step ahead of what the user can do for himself. Among some of the key questions:

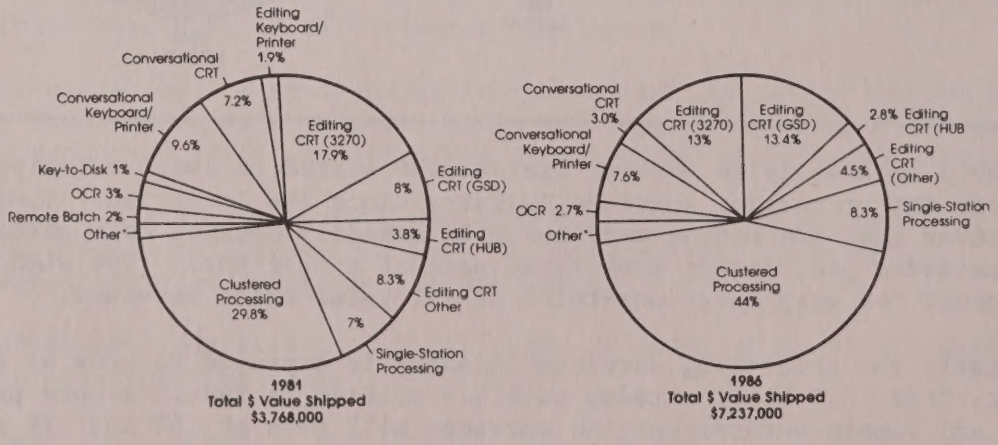
- Since processing services firms sell primarily to end users, how will the advent of personal computers and new DP/end-user cooperation affect processing services demand?
- What is the future of timesharing now that increasingly powerful microcomputers and 32-bit minis are becoming relatively inexpensive?
- Will the emergence of user-friendly systems eliminate the need for the handholding which processing services firms usually provide?
- What will be the impact of IBM's and AT&T's entrance into the market? How about the banks and accounting firms?

Terminals

A good way to put the growth of the information processing industry into human terms, is to look at the number and development of keyboards. Not only does keyboard analysis show that information technology reaches vast numbers of workers, but it demonstrates many of the key trends of the day -- distributed intelligence, ergonomics, user-friendly systems, and end-user demand.

The current U.S. installed base of general-purpose data entry terminals is over 5.4 million, and would be valued at $16.8 billion on an if-sold basis. By 1986, the numbers will swell to 15 million installed worth $42.6 billion. IDC projects that unit shipments to the U.S. terminal market will grow at a compound rate of 19% per year through 1986, from 1981's 1.3 million units to 3.1 million in 1986. Dollar values will grow at a 14% rate over the same period.

U.S. DATA ENTRY TERMINAL MARKET, 1981-1986
(Copyright 1982 -- International Data Corporation)



Note: "HUB" stands for Honeywell, Univac, Burroughs.

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Despite numerous efforts involving flat screens, portability, and improved man/machine interfaces, IDC believes that through the 1986 timeframe, today's CRT technology will remain dominant. Prices will come down a bit, and intelligence, screen quality, and ergonomic features will be improved, but the basic tube technology will be with us for some time. Among some of the factors affecting the terminal market:

- Personal computing and word processing features are becoming necessary in many environments, encouraging the already strong movement toward increased terminal intelligence. DEC and Univac have CP/M on their terminals; IBM is putting 3270 capabilities into its Personal Computer.

- IBM continues to watch its market share shrink. 3270-compatible vendors have undercut the giant's prices, and no follow-on products have emerged. Nonetheless, because of strong processor shipments and stepped up discounting, IBM should be able to hold much of its current position, and IDC believes that IBM will maintain about 25% of the U.S. installed base for the foreseeable future.

- DEC continues to gain share, shipping 40% as much as IBM in 1981.

- Now that the wraps are off AT&T, EDP/IR expects that Teletype -- or another terminal provider -- will become a much more aggressive competitor. If American Bell's Net 1 (now called Net/1000) becomes a success, it will give Ma Bell a captive terminal market.

- The lines between "dumb" and intelligent terminals are becoming less certain as vendors offer more features on low-end products to help fight declining prices and margins.

Everybody heading to the office

Once considered an interesting niche in the DP marketplace, the office has steadily emerged as the battleground of the future. 1981 saw the major mini vendors bring out their first serious office automation (OA) products, while the mainframers hemmed and hawed, paying lip service to the need to integrate OA tasks but doing relatively little to bring it about.

IBM continues to do an excellent job of making its plans unclear. A choice of Displaywriters, 5520s, 8100s and mainframe software is available, but integration is difficult and no one plan approaches the ideal. Among the other mainframers, only Burroughs and Honeywell have even taken the first step beyond word processing. Burroughs' Ofis 1 system has some innovative retrieval capabilities, and Honeywell has integrated DP/WP functions for its DPS 6 line.

Because the market is essentially one of software, the traditional office equipment market only tells part of the story. In fact, looking at the growth rates for equipment such as PBXs, facsimile machines, copiers, electronic typewriters, and word processors, one might wonder what all the fuss is about.

Only electronic typewriters and word processors are growing at more than 15% per year and the huge copier market is practically flat. Overall, the market for office automation hardware will grow at 10.2% through 1986, with 1981 shipments of $6.9 billion rising to $11.2 billion by 1986.

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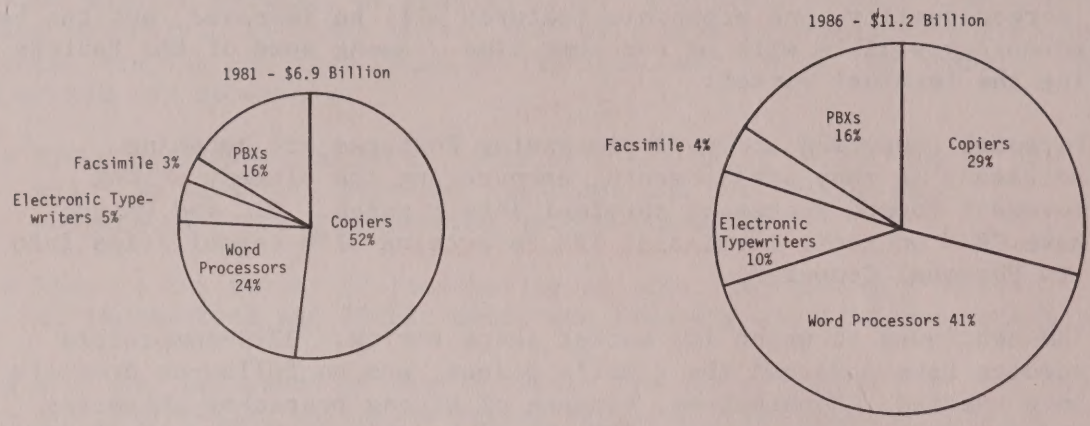
U.S. OFFICE AUTOMATION EQUIPMENT MARKET, 1981-1986
(Copyright 1981 -- International Data Corporation)



In the U.S. office market, IDC counts shipments of non-U.S.-based vendors.

The troubles in the copier market stand out. Because of declining prices in the low-end and saturation at higher levels, IDC expects that annual copier shipment revenues will change little from 1981's $3.5 billion. In light of this, no one should be surprised at Xerox's eagerness to get a piece of the office automation dollar, especially since the Japanese do not seem satisfied with their dominance of the low-end.

Despite annual growth rates of only 10.4% for the next five years, the PBX market is being actively pursued. (PBX dollar values are expressed in "wholesale prices," not including installation costs which could easily double overall revenues.) Independent suppliers such as Mitel and Rolm have had some success in loosening Ma Bell's once iron-clad grip on the marketplace. Additionally, because digital PBXs may have a role in both local area networks and as a data gateway to the outside world, vendors are paying new attention to an otherwise mature market. Even IBM is looking at the market again, as evidenced by its recent cooperation with Mitel.

Though the equipment numbers lack punch, the office remains a key market. As desktops and minis are increasingly used for office functions, the traditional office hardware categories will account for smaller and smaller segments of the office automation market. And as office features begin to be expected by end-users, smooth office software becomes vital to many DP sales.

NOTES TO CENSUS AND FORECASTS

• Inflation -- The value of computer system shipments shown in the Review and Forecast pages (in red) represents the if-sold price of equipment at the time of sale. IDC expects inflation to continue at about 7% per year.

• Value -- The value of shipments and installed base includes peripheral sales based on IDC's Average System Values, shown in the Census sections.

• Installed base -- The "Number in Use" column accounts for retirements. In the minicomputer summary, this column also accounts for "transshipments," i.e., those computers which are originally shipped to a U.S. location, but are eventually installed outside the U.S.

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COMPUTER MARKET SUMMARY
(U.S.-Based Manufacturers)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1976	100,540	407,530	$13,332	$ 76.7
1977	164,370	547,360	16,315	89.4
1978	314,230	841,640	20,109	105.2
1979	459,080	1,265,320	23,149	121.3
1980	682,330	1,911,150	26,184	140.3
1981	1,040,140	2,907,330	29,391	154.0
1982	1,755,325	4,608,855	33,887	173.5
1983	2,791,395	7,344,950	40,729	199.4
1984	3,942,275	11,224,515	48,499	230.9
1985	4,918,320	16,072,885	55,366	270.2
1986	5,871,310	21,863,535	62,371	313.2
		UNITED STATES		
1976	64,740	261,580	$ 7,098	$ 43.4
1977	113,680	356,420	9,101	50.6
1978	226,230	566,150	10,997	59.1
1979	298,010	836,760	12,528	67.3
1980	460,350	1,269,610	14,932	78.3
1981	710,070	1,952,520	17,095	88.5
1982	1,258,135	3,178,555	20,109	100.0
1983	2,083,945	5,226,100	25,015	116.5
1984	2,965,335	8,150,625	30,255	136.5
1985	3,668,260	11,773,835	34,787	162.0
1986	4,324,410	16,046,785	39,113	189.8
		INTERNATIONAL		
1976	35,800	145,950	$ 6,234	$ 33.3
1977	50,690	190,940	7,214	38.8
1978	88,000	275,490	9,112	46.1
1979	161,070	428,560	10,621	54.0
1980	221,980	641,540	11,252	62.0
1981	330,070	954,810	12,296	65.5
1982	497,190	1,430,300	13,778	73.5
1983	707,450	2,118,850	15,714	82.9
1984	976,940	3,073,890	18,244	94.4
1985	1,250,060	4,299,050	20,579	108.2
1986	1,546,900	5,816,750	23,258	123.4

This is the total of all general-purpose computers, minicomputers, small business computers, desktop computers, and "other" systems such as IBM's S/7. Minis used in SBCs are subtracted to avoid double counting.

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GENERAL-PURPOSE COMPUTER MARKET
(U.S.-Based Manufacturers)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1976	14,300	111,200	10,830	68.5
1977	17,800	111,500	12,500	77.7
1978	10,500	113,000	14,740	88.6
1979	10,600	105,900	15,790	97.9
1980	20,100	110,700	16,650	108.1
1981	21,700	110,200	17,360	110.6
1982	20,900	113,600	18,460	115.5
1983	22,400	119,400	20,300	122.1
1984	23,000	126,300	22,100	128.6
1985	22,700	134,100	23,300	137.5
1986	22,400	140,700	24,700	144.8
		UNITED STATES		
1976	6,700	59,600	5,530	37.9
1977	8,900	58,200	6,600	42.9
1978	4,300	58,000	7,590	48.4
1979	5,000	53,500	7,930	52.5
1980	9,900	55,000	8,840	58.0
1981	10,700	55,600	9,640	61.4
1982	10,600	56,400	10,300	63.7
1983	11,300	59,000	11,400	67.3
1984	11,700	62,300	12,400	70.4
1985	11,500	65,900	13,000	75.1
1986	11,300	68,900	13,700	78.7
		INTERNATIONAL		
1976	7,600	51,600	5,300	30.6
1977	8,900	53,300	5,900	34.8
1978	6,500	55,000	7,150	40.2
1979	5,600	52,400	7,860	45.4
1980	10,200	55,700	7,810	50.1
1981	11,000	54,600	7,720	49.2
1982	10,300	57,200	8,160	51.8
1983	11,100	60,400	8,900	54.8
1984	11,300	64,000	9,700	58.2
1985	11,200	68,200	10,300	62.4
1986	11,100	71,800	11,000	66.1

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MINICOMPUTER MARKET -- U.S.-BASED MANUFACTURERS[a]

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1976	58,600	235,500	1,550	5.2
1977	83,300	312,700	2,410	7.4
1978	103,100	407,600	3,170	10.4
1979	123,800	519,300	4,020	14.1
1980	156,000	660,000	5,050	18.8
1981	149,000	790,900	6,180	24.5
1982	151,500	920,600	7,175	31.2
1983	171,800	1,064,300	8,635	39.2
1984	210,300	1,241,200	10,590	49.0
1985	261,600	1,463,500	12,850	60.9
1986	323,400	1,741,500	15,355	75.2
		UNITED STATES		
1976	42,200	162,500	995	3.4
1977	60,800	215,500	1,570	4.8
1978	71,700	277,300	2,005	6.6
1979	82,000	346,000	2,555	8.8
1980	94,700	426,200	3,240	11.8
1981	88,800	499,500	3,830	15.2
1982	89,400	571,700	4,375	19.2
1983	101,400	651,200	5,265	24.0
1984	122,000	747,600	6,355	29.8
1985	151,700	869,600	7,710	36.8
1986	184,300	1,019,900	9,060	45.1
		INTERNATIONAL		
1976	16,400	73,000	555	1.8
1977	22,500	97,200	840	2.6
1978	31,400	130,300	1,165	3.8
1979	41,800	173,300	1,465	5.3
1980	61,300	233,800	1,810	7.0
1981	60,200	291,400	2,350	9.3
1982	62,100	348,900	2,800	12.0
1983	70,400	413,100	3,370	15.2
1984	88,300	493,600	4,235	19.2
1985	109,900	593,900	5,140	24.1
1986	139,100	721,600	6,295	30.1

[a]International Manufacturers with U.S.-based sales offices are counted in the U.S. totals, but not international.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Computer Census are based on the best information available to IDC but are estimates nevertheless. General-Purpose computers -- as characterized by IBM's System/3, System/38, 370, 4300, 303X, and 3081, and competitors -- are designed for use in a wide variety of applications. They are character or byte oriented and programmed in higher level languages. Many of the General-Purpose computer manufacturers also market smaller systems, also general-purpose in design, which are included in the Small Business Computer and Minicomputer censuses.

Instead of being defined by shifting average purchase or rental values, size classes are based on IBM products and other manufacturers' models that compete with them, e.g., a computer in size class 7 would compete with an IBM 3081. Average purchase and monthly rental values are based on system price including peripherals except for plug-compatible vendors Amdahl, Cambex, Control Data Corporation-Omega, IPL, Magnuson, and National Advanced Systems, where only CPU value is counted. An "X" in the last column means none will be shipped from the original manufacturer, and an "*" means none will be shipped until after 1982.

GENERAL-PURPOSE CENSUS AS OF JANUARY 1, 1982

Name of Manufacturer	Computer Model	Size Class	Average Purchase Price ($000)	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Amdahl	470V/5 II	6	2,240	09/77	41	33	74	X
	470V/6 II	7	3,330	06/75	130	52	182	X
	470V/7, A, B	7	2,515	09/78	126	98	224	40
	470V/7C	6	1,100	02/81	27	16	43	36
	470V/8	7	2,850	09/79	76	51	127	55
	580/5860	7	3,950	08/82	0	0	0	20
	580/5870	7	5,750	3Q/83	0	0	0	*
	580/5880	7	7,100	2Q/83	0	0	0	*
	TOTAL				400	250	650	151
Burroughs	2/3/500	3	315	11/61	160	86	246	X
	1710	2	132	08/72	295	321	616	X
	1720	2	355	02/73	217	219	436	X
	1815/25/30	3	115	05/77	270	530	800	20
	1855/60/70/85	2	243	05/77	1,660	660	2,320	500
	1905	3	103	04/80	170	40	210	230
	1955/85	2	189	04/80	805	320	1,125	600
	2500	3	499	02/67	8	5	13	X
	2700	4	530	08/72	120	77	197	X
	2800	4	411	12/76	245	130	375	X
	2900	4	458	07/80	317	155	472	200
	3500	4	910	05/67	130	117	247	X
	3700	4	1,230	11/72	184	186	370	X
	3800	4	629	04/77	270	77	347	10
	3900	4	650	04/81	55	5	60	160
	45/4700	5	1,561	10/71	186	80	266	X
	4800	5	1,269	09/76	272	95	367	X
	55/5700	5	1,680	03/63	18	9	27	X
	5900	5	500	01/81	90	10	100	150
	65/6700	6	3,168	11/69	104	80	184	X
	6800	5	1,649	06/77	310	125	435	20
	6900	5	2,140	11/80	113	38	151	150
	7700	7	6,421	08/73	45	27	72	X
	7800	7	4,820	11/78	58	22	80	10
	TOTAL				6,102	3,414	9,516	2,050
Cambex	1636	4	130	10/81	1	0	1	8
	1638/40	4	120	01/79	12	7	19	3
	1641	4	210	10/80	3	10	13	5
	1651	5	285	1Q/82	0	0	0	5
	TOTAL				16	17	33	21
Control Data Corp.	Omega 480-1	4	376	06/77	71	3	74	X
	Omega 480-2	5	392	08/78	63	4	67	X
	Omega 480-3	5	425	01/80	55	3	58	X
	Subtotal				189	10	199	0
	Cyber 170-720	5	1,360	05/79	70	85	155	45
	Cyber 170-730	6	1,940	06/79	41	20	61	15
	Cyber 170-740	6	2,880	04/80	7	0	7	20
	Cyber 170-750	6	4,239	08/79	19	20	39	15
	Cyber 170-760	7	5,290	04/79	28	4	32	20
	Cyber 71	4	959	07/76	2	5	7	X
	Cyber 171	4	1,092	08/77	13	45	58	X
	Cyber 72	5	1,832	10/71	7	21	28	X
	Cyber 172	6	1,947	07/75	21	46	67	X
	Cyber 73	6	2,072	03/72	20	30	50	X
	Cyber 173	6	3,173	09/75	11	24	35	X
	Cyber 74	7	4,827	03/72	22	13	35	X
	Cyber 174	6	4,055	09/75	13	16	29	X
	Cyber 175	7	5,776	08/75	20	28	48	X
	Cyber 76	7	7,912	03/72	6	8	14	X
	Cyber 176	7	7,140	01/78	13	3	16	3
	Cyber 203	7	9,520	11/80	4	0	4	2
	Cyber 205	7	10,510	01/81	3	1	4	7
	Cyber 855	6	1,935	4Q/82	0	0	0	10
	Cyber 865	7	2,465	2Q/83	0	0	0	*
	Cyber 875	7	3,230	4Q/82	0	0	0	*
	Subtotal				320	369	689	137
	G-20	4	830	04/61	3	0	3	X
	1604	6	1,751	01/60	6	0	6	X
	31/3150	4	419	12/64	22	11	33	X
	3170	5	971	12/70	11	4	15	X
	3200	4	625	05/64	16	10	26	X
	3300	5	1,491	09/65	69	23	92	X
	3400	5	1,020	11/64	2	0	2	X
	3500	5	1,342	01/69	25	12	37	X
	3600	6	2,107	06/63	6	5	11	X
	3800	6	2,568	12/65	12	1	15	X
	6200	6	1,849	11/70	-	-	-	X
	6400	6	2,722	05/66	30	10	40	X
	6500	6	3,698	12/67	14	11	25	X
	6600	7	4,988	08/64	40	14	54	X
	6700	7	6,066	07/70	2	-	2	X
	7600	7	8,194	01/69	22	6	28	X
	Star 100	7	12,040	12/74	-	-	-	X
	Subtotal				280	107	389	0
	TOTAL				789	486	1,277	137

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GENERAL-PURPOSE COMPUTER CENSUS - (continued)

Name of Manufacturer	Computer Model	Size Class	Average Purchase Price ($000)	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Cray	1A	7	8,560	04/76	9	7	16	
	1S	7	7,330	11/80	14	2	16	15
	TOTAL				23	9	32	15
Denelcor	HEP	7	2,225	02/82	0	0	0	7
Digital Equipment Corporation	2020	3	295	07/78	195	170	365	40
	2040/50	4	700	06/76	107	65	172	5
	2060	5	960	07/79	181	95	276	70
	PDP-6	4	400	10/64	1	1	2	X
	1040/50	4	694	10/67	78	35	113	X
	1060/70	5	880	06/72	93	60	153	X
	1080/90	6	1,320	06/75	225	115	340	40
	TOTAL				880	541	1,421	155
HIS	DPS 8/20	4	515	04/80	45	19	64	60
	DPS 8/44	4	810	01/80	49	40	89	50
	DPS 8/52	5	1,790	11/80	25	16	41	70
	DPS 8/62	5	2,200	12/81	3	0	3	50
	DPS 8/70	6	3,480	05/80	63	45	108	80
	Subtotal				185	120	305	310
	H 61/40	2	101	06/76	-	1,965	1,965	120
	H-61/58	2	104	06/74	87	692	779	X
	H-61/60	2	154	06/74	43	2,311	2,354	50
	H-Level 62	3	242	10/74	900	2,310	3,210	40
	DPS 4	3	80	07/80	-	1,953	1,953	1,500
	64/300	4	378	04/79	115	864	979	500
	H Level 64	4	549	10/74	260	1,002	1,262	X
	H-66/05/07	4	825	10/76	80	137	217	X
	H-66/10/17	5	1,339	06/75	50	109	159	X
	H-66/20/27	5	1,945	11/74	90	150	240	X
	H-66/40/60	6	3,690	10/74	130	167	297	2
	H-66/440/520	5	840	12/79	100	45	145	15
	H-66 DPS, BC	6	3,360	07/78	120	194	314	10
	H-66/80	7	5,672	10/74	20	57	77	X
	H-68/80	7	4,814	10/74	25	2	27	X
	H-68/DPS	7	5,360	09/78	31	12	43	16
	Comshare/Xerox	5	612	06/79	18	-	18	10
	Subtotal				2,069	11,970	14,039	2,263
	G-50	2	82	08/70	70	1,010	1,080	X
	G-100	3	215	04/66	56	611	667	X
	G-200	4	425	04/61	48	11	59	X
	G-400	4	690	05/64	83	91	174	X
	G-600	6	3,425	04/65	20	11	31	X
	G-6023/25	5	1,510	11/73	16	16	32	X
	G-6030/40	5	1,900	06/71	28	78	106	X
	G-6050/60	6	3,315	07/71	75	50	125	X
	G-6070/80	6	4,980	07/71	25	29	54	X
	G-6180	7	4,830	02/74	3	-	3	X
	Gamma-10	2	108	07/64	-	291	291	X
	Gamma-30	4	437	02/62	-	22	22	X
	Subtotal				424	2,220	2,644	0
	H 105/115	3	280	03/70	70	91	161	X
	H 110/120/200	3	297	01/66	140	80	220	X
	H-125	4	369	12/67	6	43	49	X
	H-2020/30	3	198	01/73	209	58	267	X
	H-1015/2015	4	818	02/71	22	16	38	X
	H-1200	4	629	02/66	112	28	140	X
	H-2040	4	599	04/72	91	48	139	X
	H-2050/60	4	941	04/72	93	61	154	X
	H-2200	4	862	01/66	47	13	60	X
	H-2070	5	1,681	05/72	24	2	26	X
	H-3200	5	1,302	02/70	44	21	65	X
	H-4200	5	1,984	09/68	6	1	7	X
	H-8200	6	3,075	02/69	12	6	18	X
	H-4/1400	4	573	12/61	6	5	11	X
	H-8/1800	5	1,500	12/60	5	2	7	X
	Subtotal				887	475	1,362	0
	TOTAL				3,565	14,785	18,350	2,573
IBM	System/38-3	2	140	07/80	630	570	1,200	
	System/38-4	3	145	08/81	65	-	65	
	System/38-5	3	290	07/80	2,795	1,890	4,685	2,400
	System/38-7	4	380	07/82	0	0	0	
	Subtotal				3,490	2,460	5,950	2,400
	System/3-4	2	62	06/76	100	30	130	X
	System/3-6	2	79	12/70	365	130	495	X
	System/3-8	2	100	06/75	885	1,100	1,985	X
	System/3-10	2	118	01/70	3,335	1,110	4,445	X
	System/3-12	3	173	03/76	1,675	1,475	3,150	X
	System/3-15	3	338	03/74	2,855	1,505	4,360	X
	Subtotal				9,215	5,350	14,565	0
	4321	3		03/82	0	0	0	
	4331-1	3	335	04/79	3,950	2,830	6,780	3,500
	4331-11	4	370	03/82	0	0	0	
	4331-2	4	555	08/80	795	550	1,345	
	4341-10	4	785	03/82	0	0	0	
	4341-1	4	860	10/79	4,420	4,275	8,695	3,600
	4341-11	4	895	03/82	0	0	0	
	4341-2	5	995	03/81	475	350	825	900
	Subtotal				9,640	8,005	17,645	8,000
	3031	6	2,390	03/78	1,000	1,180	2,180	X
	3032	6	3,972	03/78	290	470	760	X
	3033S	6	3,270	01/81	65	20	85	60
	3033N	7	3,680	01/80	220	280	500	
	3033UAM	7	6,880	03/78	950	610	1,560	100
	Subtotal				2,525	2,560	5,085	160

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GENERAL-PURPOSE COMPUTER CENSUS - (continued)

Name of Manufacturer	Computer Model	Size Class	Average Purchase Price ($000)	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
IBM (Continued)	3081D	7	7,100	10/81	120	80	200	644
	3081K	7	7,700	06/82	0	0	0	
	Subtotal				120	80	200	644
	370/115	3	478	04/74	275	1,010	1,285	X
	370/125	4	652	06/73	350	805	1,155	X
	370/135	4	1,000	05/72	455	545	1,000	X
	370/138	4	943	11/76	1,160	1,640	2,800	X
	370/145	5	1,871	07/71	560	510	1,070	X
	370/148	5	1,558	03/77	1,065	1,100	2,165	X
	370/155	6	3,368	02/71	270	80	350	X
	370/158	6	4,848	05/73	1,330	880	2,210	X
	370/165	7	6,344	06/71	55	11	66	X
	370/168	7	9,320	07/73	610	250	860	X
	370/195	7	12,800	03/71	9	3	12	X
	Subtotal				6,139	6,834	12,973	0
	360/20	3	126	12/65	440	220	660	X
	360/22	3	141	07/71	24	30	54	X
	360/25	3	391	10/68	27	95	122	X
	360/30	4	528	06/65	605	195	800	X
	360/44	4	881	07/66	33	16	49	X
	360/40	4	895	06/65	550	195	745	X
	360/50	5	1,551	08/65	235	95	330	X
	360/65	6	3,250	11/65	220	40	260	X
	360/67,75,85	7	6,016	01/66	25	8	33	X
	360/9X	7	9,146	11/67	4	2	6	X
	Subtotal				2,163	896	3,059	0
	1130	2	120	02/66	715	400	1,115	X
	1401	3	178	09/60	310	45	355	X
	1401G-H	2	106	05/64	6	1	7	X
	1410	4	800	11/61	7	1	8	X
	1440	3	227	04/63	17	10	27	X
	1460	4	460	10/63	5	1	6	X
	1620	3	129	09/60	32	18	50	X
	7010	5	1,200	10/63	4	1	5	X
	7030	7	-	05/61	-	-	-	X
	7040/44	5	1,439	06/63	4	1	5	X
	7070/74	5	1,299	03/60	27	-	27	X
	7080	6	2,800	08/61	17	-	17	X
	7090/94	6	3,350	08/60	8	2	10	X
	Subtotal				1,152	480	1,632	0
	TOTAL				34,444	26,665	61,109	11,204
IPL	4436	4	190	11/80	23	11	34	15
	4443	4	240	03/80	50	63	113	40
	4445	4	270	4Q/82	*	*	*	7
	4446	4	310	12/81	7	1	8	35
	TOTAL				80	75	155	97
Magnuson	M80/3	4	210	01/79	18	1	19	X
	M80/4	5	313	12/78	41	4	45	X
	M80/30	4	94	08/81	18	2	20	20
	M80/30E	4	112	12/81	1	0	1	20
	M80/31	4	150	06/80	55	6	61	10
	M80/32	4	225	06/80	103	11	114	10
	M80/41	4	196	02/82	*	*	*	25
	M80/42	4	324	03/81	53	6	59	15
	M80/43	5	384	03/81	48	5	53	25
	TOTAL				337	35	372	180
National Advanced Systems	AS/3	4	610	11/78	28	33	61	X
	AS/4	5	950	06/77	23	11	34	X
	AS/5	6	1,485	03/77	122	89	211	X
	AS/7020/309	5	800	01/79	-	10	10	X
	AS/7031	6	1,365	12/78	43	29	72	X
	AS/6	6	2,385	12/78	48	39	87	X
	AS/3000	4	470	01/80	25	7	32	5
	AS/5000	5	575	02/80	70	35	105	40
	AS/6130	5	1,095	4Q/82	0	0	0	5
	AS/6150	5	1,160	1Q/83	0	0	0	*
	AS/7000	6	1,640	04/80	35	33	68	35
	AS/9000	7	4,335	12/80	11	11	22	32
	AS/9060	7	3,500	4Q/82	0	0	0	5
	AS/9080	7	5,200	4Q/82	0	0	0	3
	TOTAL				405	297	702	125
NCR	8270	2	95	11/79	404	620	1,024	350
	8350	2	152	07/77	124	5	129	X
	8370	3	283	07/78	10	-	10	X
	8410	2	169	02/79	240	290	530	150
	8430	3	250	06/78	77	270	347	120
	8450	3	377	11/77	170	155	325	X
	8455	3	275	04/79	147	260	407	40
	8535II	3	220	04/82	0	0	0	120
	8545II	3	315	04/82	0	0	0	120
	8550	3	583	04/76	190	168	358	X
	8555	3	465	04/79	260	240	500	40
	8555II	3	400	04/82	0	0	0	190
	8560	4	726	11/77	44	26	70	X
	8565	4	570	04/79	90	151	241	30
	8565 II	4	440	04/82	0	0	0	70
	8570	4	905	05/76	90	86	176	X
	8575	4	695	04/79	95	68	163	20
	8580	5	1,614	12/78	5	10	15	X
	8585	5	1,390	08/79	28	49	77	5
	8650	6	2,200	11/81	0	2	2	12
	8670	6	3,000	05/82	0	0	0	8
	8575 II	5	514	05/82	0	0	0	20
	8585 II	5	549	05/82	0	0	0	40
	8595 II	5	696	05/82	0	0	0	20
	Subtotal				1,974	2,400	4,374	1,355

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GENERAL-PURPOSE COMPUTER CENSUS - (continued)

Name of Manufacturer	Computer Model	Size Class	Average Purchase Price ($000)	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
NCR (Continued)	Century 50	2	80	02/71	137	16	153	X
	Century 75	2	117	07/76	44	-	44	X
	Century 100	3	162	09/68	142	225	367	X
	Century 101	3	206	10/72	403	357	760	X
	Century 151	3	289	02/75	158	108	266	X
	Century 200	4	378	09/69	90	124	214	X
	Century 201	4	590	09/69	109	58	167	X
	Century 251	4	1,005	11/73	24	39	63	X
	Century 300	5	1,400	02/72	65	51	116	X
	315	3	169	05/62	4	20	24	X
	315-RMC	4	523	09/65	3	2	5	X
	Subtotal				1,179	1,000	2,179	0
	TOTAL				3,153	3,400	6,553	1,355
Singer	System 10	2	120	10/70	1,000	-	1,000	X
Sperry Univac	III	4	1,124	08/62	-	-	-	X
	SS 80/90	3	355	08/58	-	2	2	X
	418 I, II	4	450	06/63	29	30	59	X
	418 III	4	1,700	06/69	47	93	140	X
	491/492	5	1,150	12/61	2	3	5	X
	494	6	3,200	02/66	62	49	111	X
	1004	2	46	02/63	186	57	243	X
	1005	2	85	04/66	121	7	128	X
	1050	3	380	09/63	40	8	48	X
	Subtotal				487	249	736	0
	9200	2	98	06/67	550	327	877	X
	9300	3	212	09/67	450	273	723	X
	9400/80	4	530	05/69	137	300	437	X
	90/25	3	184	08/77	50	91	141	X
	90/30	3	392	02/75	820	1,337	2,157	20
	90/40	4	714	06/78	130	172	302	9
	90/60	4	1,109	01/74	120	147	267	X
	90/70/9700	5	1,275	08/72	5	23	28	X
	90/80	5	2,940	12/76	90	55	145	X
	System/80-3	2	140	12/80	265	430	695	600
	System/80-5	3	203	20/82	0	0	0	150
	Subtotal				2,617	3,155	5,772	779
	1106	6	1,920	12/69	35	125	160	X
	1107	6	2,525	10/62	1	3	4	X
	1108	7	3,745	09/65	153	57	210	X
	1110	7	6,250	06/72	20	50	70	X
	1100/10	5	1,955	04/76	83	165	248	X
	1100/20	5	2,650	04/75	6	28	34	X
	1100/40	6	4,470	07/75	39	41	80	X
	1100/60	5	1,720	01/80	220	475	695	509
	1100/80/81/82	6	5,254	03/77	160	155	315	10
	1100/83	7	8,325	07/78	15	20	35	5
	1100/84	7	10,040	11/78	25	20	45	X
	Subtotal				757	1,139	1,896	524
	301	4	295	10/60	6	-	6	X
	501	5	695	05/59	-	-	-	X
	3301	5	1,021	09/64	26	-	26	X
	Spectra 70/15	3	203	09/65	2	-	2	X
	Spectra 70/25	3	343	09/65	-	1	1	X
	Spectra 70/35	4	634	01/67	17	3	20	X
	Spectra 70/45	5	1,181	11/65	57	2	59	X
	Spectra 70/46	5	1,963	11/68	4	-	4	X
	Spectra 70/55	5	1,800	11/68	1	-	1	X
	Spectra 70/60	6	2,245	09/70	17	-	17	X
	Spectra 70/61	6	2,350	03/71	2	1	3	X
	Spectra 1600	3	180	01/69	17	-	17	X
	Spectra 70/2	4	620	07/71	3	-	3	X
	Spectra 70/3	4	1,040	10/71	6	-	6	X
	Spectra 70/6	6	1,680	10/71	18	-	18	X
	Spectra 70/7	6	2,140	10/71	12	2	14	X
	Subtotal				188	9	197	0
	TOTAL				4,049	4,552	8,601	1,303
Xerox	Sigma 5	4	585	08/67	102	10	112	X
	Sigma 6	4	1,041	11/70	22	13	35	X
	Sigma 7	5	1,169	12/66	52	7	59	X
	Sigma 8	4	928	09/71	1	1	2	X
	Sigma 9	6	2,440	11/71	71	27	98	X
	530	3	188	08/73	88	15	103	X
	550/560	4	634	11/74	23	3	26	X
	940	5	1,050	04/66	31	-	31	X
	9300	3	340	11/64	9	2	11	X
	Total				399	78	477	0
GRAND TOTAL					55,635	54,604	110,239	

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MINICOMPUTER CENSUS

IDC categorizes computers as "minicomputers" based primarily on the perceived marketplace for these products. By definition, minis are general-purpose in design, but are sold as tools as well as solutions; are available from makers in configurations ranging from board only to complete systems; are available to OEMs and are usually discounted in volume buys; are part of a family with low-end products generally in the $1,000-$25,000 price range; and have at least 4K RAM. Minicomputers range in size class from Microminis (M), which compete with high-end Microcomputers, to Traditional Minis (T), to Superminis (S), which frequently compete with small General-Purpose computers in interactive commercial applications. This census counts "Cumulative Number Shipped," making no attempt to account for retirements.

MINICOMPUTER CENSUS AS OF JANUARY 1, 1982

Name of Manufacturer	Computer Model	Bits Per Word	Size Class	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Able Computer	34 Magnum	16	T	21	14	10/81	10	0	10	50
	44 Magnum	16	S	27	16	07/81	20	0	20	100
						TOTAL	30	0	30	150
Ampex	8MS/86	16	T	7	6	06/78	1,700	1,300	3,000	NA
	Difference Series	16	T	14	19	12/80				NA
Artonix*	PC-12/7	12	T	20	45	09/71	135	40	175	X
Apollo Computer	DN400	16	S	31	35	03/81	64	16	80	NA
	DN420	16	S	33	40	03/81	16	4	20	NA
						TOTAL	80	20	100	
August Systems	Series 300	16	S	35	25	11/81	3	0	3	35
BTI Computer Systems	4000/15	16	T	30	35	01/76	341	8	349	X
	4000/25	16	T	42	49	01/76	251	12	263	X
	5000	16	S	30	39	09/78	3,400	110	3,510	1,300
	5000/ES	16	S	25	30	07/79	74	0	74	5
	8000	32	S	107	200	05/81	23	3	26	80
						TOTAL	4,089	133	4,222	1,385
Bytronix	Series 500	16	T	3	4	09/80	155	275	430	1,500
	Series 1000	16	T	5	5	12/77	180	550	730	
	Series 2000	16	T	8	8	12/78	75	115	190	X
	Series 3000	16	T	7	8	12/78	85	445	530	X
	Series 4000	16	T	7	5	03/81	100	300	400	500
	Series 5000	16	T	10	7	09/81	5	10	15	200
						TOTAL	600	1,695	2,295	2,200
Century Computer Corp.	C-200	8	T	5	7	02/71	150	0	150	X
Charles River Data	Universe 68/15	32	S	19	15	02/82	0	0	0	NA
	Universe 68/17	32	S	21	17	04/82	0	0	0	NA
	Universe 68/27	32	S	17	14	08/82	0	0	0	NA
	Universe 68/37	32	S	18	15	08/82	0	0	0	NA
	Universe 68/47	32	S	22	18	08/82	0	0	0	NA
	Universe 68/80	32	S	39	31	10/81	8	0	8	NA
						TOTAL	8	0	8	
Cincinnati Milacron	CIP/2000 Series	8	T	4	17	07/69	4,676	804	5,480	X
	CIP/4000 Series	10	T	4	17	12/76				X
Compiler Systems, Inc.*	CSI-16	16	T	11	20	11/70	80	10	90	X
	CSI-24	24	T	15	30	12/70	35	5	40	X
						TOTAL	115	15	130	
Computer Automation, Inc.	108, 208, 808	8	T	5	11	04/68	280	30	310	X
	116	16	T	8	16	08/70	200	50	250	X
	216	16	T	8	20	07/69	350	45	395	X
	816	16	T	10	15	12/68	40	5	45	X
	Alpha-8, Naked Mini-8	8	T	2	3	05/72	5,002	1,340	6,342	X
	Alpha-16, Naked Mini-16	16	T	3	8	10/71				X
	LSI 2/10, 2/20, 2/60	16	T, T, S	2	5	12/73	21,462	2,540	24,002	1,500
	LSI 2/40	16	T	8	18	04/80	66	62	128	150
	LSI 3/05	16	M	1	2	02/76	2,332	679	3,011	80
	LSI 4/10	16	M	1	2	06/77	4,032	2,052	6,084	2,100
	LSI 4/30	16	T	2	4	06/77	1,404	460	1,864	430
	LSI 4/90	16	S	4	9	06/77	711	315	1,026	350
	LSI 4/95	16	S	10	24	01/80	40	12	52	50
	Scout Naked Mini 4/04	16	M	0.6	2	01/80	267	222	489	140
						TOTAL	36,186	7,812	43,998	4,800
Computer Talk Inc.	CT-400	16	S	32	45	09/75	7	0	7	10
	CT-407	16	S	41	45	12/77	3	0	3	
						TOTAL	10	0	10	
Control Data Corp.	1700	16+2	S	37	160	03/66				X
	1700-SC	16+2	S	20	60	09/70				X
	System 17	16+2	T	14	39	02/74				X
	Cyber 18-10	16+2	T	14	40	--/76	2,060	1,415	3,475	
	Cyber 18-20	16+2	T	16	75	--/76				290
	Cyber 18-30	16+2	S	110	116	09/76				
	Cyber 18-5	16+2	T	14	35	--/77				
	Elbit-100	12	T	6	8	06/77	5	445	450	X
						TOTAL	2,065	1,860	3,925	
Data General Corp.	MP 100, 200	16	M	1	3	05/79	2,700	800	3,500	150
	Micro Nova	16	M	2	4	11/79	7,995	3,325	11,320	5,400
	Nova	16	T	6	12	02/69	670	330	1,000	X
	Nova 2 Series	16	T	3	10	10/73	7,280	2,720	10,000	300
	Nova 3/4	16	T	4	10	01/76	3,240	1,060	4,300	600
	Nova 3/12	16	T	5	18	01/76	10,570	4,830	15,400	1,700
	Nova 3/D	16	T	12	36	10/76	2,240	2,060	4,300	900
	Nova 4/C	16	T	3	12	03/79				
	Nova 4/S	16	T	3	16	03/79	9,000	6,000	15,000	8,200
	Nova 4/X	16	T	10	33	03/79				
	Nova 800/820	16	T	7	40	03/71	1,620	580	2,200	X
	Nova 830/840	16	S	16	44	07/73	520	280	800	X
	Nova 1200 Series	16	T	3	11	12/70	10,870	4,130	15,000	X
	Super Nova SC	16	T	9	27	04/70	140	60	200	X
	Eclipse S100, 130, 140	16	S	11	30	02/75	3,300	1,700	5,000	2,300
	Eclipse AP/130	16	S	30	50	09/78				
	Eclipse S200, 230	16	S	15	55	02/75	3,870	1,330	5,200	500
	Eclipse S/250	16	S	35	150	11/78	380	120	500	60
	Eclipse C/150	16	S	55	120	12/78	380	220	600	250
	Eclipse C/300, 330	16	S	24	150	02/75	800	200	1,000	30
	Eclipse C/350	16	S	130	180	11/78	600	200	800	230
	Eclipse M/600	16	S	164	215	05/78	285	95	380	15
	Eclipse MV/6000	32	S	120	200	02/82	0	0	0	NA
continued on next page	Eclipse MV/8000	32	S	153	300	10/80	190	110	300	300
						SUBTOTAL	66,650	30,150	96,800	

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Name of Manufacturer	Computer Model	Bits Per Word	Size Class	Purchase Price ($1,000) Basic	Purchase Price ($1,000) Average	Date of First Installation	Number Installed in U.S.	Number Installed Outside U.S.	Total Number Installed	Shipments Next 12 Months
Data General Corp. (continued)	DCC-112	12	T	3	12	08/70	900	500	1,400	X
	DCC-116	16	T	5	10	11/71	9,600	1,700	11,300	X
	DCC-416/616	16	T/S	3	7	09/75	180	20	200	X
	DCC-Model 5	16	T	3	6	02/76	90	10	100	X
						SUBTOTAL	10,770	2,230	13,000	
						TOTAL	77,420	32,380	109,800	
Datamate Computer Systems*	DM-16	16	T	17	26	11/69	12	0	12	X
	DM-70	16	T	9	15	12/70	25	0	25	X
	ECP-18	18	T	14	16	11/66	21	0	21	X
						TOTAL	58	0	58	
Datum, Inc.*	Enchancer E 1/16	16	T	8	15	03/76	15	3	18	X
Digiac Corp.*	3060		T	9	13	01/70	70	20	90	X
	3080	25	T	20	25	12/64	14	2	16	X
						TOTAL	84	22	106	
Digital Equipment Corp.	PDP-8/a,e,f,m	12	T	4	15	04/71	43,800	21,250	65,050	9,000
	PDP-8/i,l,s	12	T	8	27	05/65	5,765	3,685	9,450	X
	PDP-9, 9L	18	T	35	50	12/66	290	160	450	X
	PDP-11/03, LSI 11	16	M	2	3	06/75	102,480	66,100	168,580	48,000
	PDP-11/23, LSI 11/23	16	M	2	6	--/79				
	PDP-11/04,05,10,15,20	16	T	5	17	03/70	31,070	17,600	48,670	2,000
	PDP-11/34,35,40	16	T	9	40	01/73	27,165	20,490	47,655	7,000
	PDP-11/44	16	S	23	60	--/80	3,525	2,270	5,795	5,000
	PDP-11/45,50,55	16	S	24	91	04/72	4,550	1,460	6,010	X
	PDP-11/60	16	S	26	75	06/77	1,150	1,060	2,210	50
	PDP-11/70	16	S	60	175	07/75	7,480	3,320	10,800	1,000
	VAX-11/730	32	S	47	65	4Q/82	0	0	0	NA
	VAX-11/750	32	S	47	100	--/80	685	555	1,240	2,000
	VAX-11/780	32	S	128	305	05/78	2,390	1,660	4,050	2,200
	VAX-11/782	32	S	395	500	2Q/82	0	0	0	NA
	PDP-12	12	T	13	46	04/69	510	255	765	X
	PDP-15 XVM	18	T	15	82	02/70	550	320	870	X
						TOTAL	231,410	140,185	371,595	
Digital Microsystems	Hex-29	16	S	13	22	04/79	20	20	40	X
Digital Scientific Corp.	Meta-4/4000	16	S	29	90	04/70	140	15	155	X
	Meta-4/5010	16	S	21	40	10/78	5	0	5	X
	Meta-4/5020	16	T	25	90	04/78	48	0	48	3
	Meta-4/5030	16	S	53	140	06/79	15	1	16	8
						TOTAL	208	16	224	11
Electronic Associates, Inc.	Pacer-100	16	T	15	40	05/72	173	141	314	13
Foto-Mem, Inc.*	Contour-100	8	T	6	20	04/70	25	0	25	X
Formation	F/4000	32	S	91	134	08/81	21	5	26	17
Four-Phase Systems, Inc.[a]	Two Pi V/32	32	S	125	125	06/78	100	6	106	X
	System 311	32	S	160	265	02/81	95	5	100	150
	System 312	32	S	210	320	12/81	2	0	2	
						TOTAL	197	11	208	150
General Automation	GA-18/30	16	S	18	50	07/69	780	210	990	X
	SPC-12	8	T	4	16	01/68	3,250	860	4,110	X
	SPC-16	16	T	5	25	05/70	7,540	2,125	9,665	X
	16/110,220	16	M	1	3	12/75	7,845	2,010	9,855	2,100
	16/330,340	16	T	3	10	01/76	405	140	545	X
	16/440,460	16	S	12	30	07/75	2,070	625	2,695	40
	16/550	16	S	25	50	03/78	9	2	11	X
	230,240	16	M	7	9	05/80	573	225	798	450
	470,480	16	S	16	21	08/82	425	200	625	220
	900	16	S	7	30	04/82	0	0	0	NA
						TOTAL	22,897	6,397	29,294	
GRI Computer Corp.	909 Series	16	T	4	9	01/70	320	150	470	X
	99/30, 38	16	T	5	15	06/72	578	268	846	X
	99/10, 18	16	T	3	5	06/72	24	0	24	X
	99/40, 48	16	T	6	17	06/72	207	278	485	X
	99/50, 58	16	T	6	12	--/74	146	44	190	X
	99/52	16	T	8	17	--/76	7	3	10	X
	GRIP	16	T	30	30	11/78	25	0	25	X
						TOTAL	1,307	743	2,050	
GT&E*	IS/I	16	T	14	36	01/70	160	40	200	X
	IS/1000	16	T	6	10	06/72	4,000	75	4,075	X
						TOTAL	4,160	115	4,275	
Harris	6024/1	24	S	69	135	05/69	21	1	22	X
	6024/3	24	S	49	90	02/70	118	1	119	X
	Slash 4	24	S	24	110	08/73	243	18	261	3
	Slash 5	24	S	16	50	05/72	766	6	772	X
	Slash 6	24	S	20	70	12/76	323	10	333	3
	Slash 7	24	S	45	180	10/75	18	1	19	X
	Series 100	24	S	85	190	10/75	37	1	38	X
	Series 200	24	S	179	240	10/75	52	3	55	X
	Series 1X5	24	S	85	175	09/77	117	19	136	X
	Series 5X0	24	S	195	300	12/78	89	9	98	X
	H80	24	S	70	125	02/81	14	8	22	10
	H100	24	S	45	150	01/79	145	10	155	15
	H300	24/48	S	105	200	09/81	26	4	30	18
	H500	24/48	S	100	250	01/79	140	39	179	75
	H800	24/48	S	170	275	03/80	125	7	132	60
						TOTAL	2,234	137	2,371	184
Hewlett-Packard	2100A	16	T	7	15	06/71	7,900	3,400	11,300	X
	2100S	16	T	16	36	08/73	1,825	1,425	3,250	X
	2114/15/16	16	T	9	29	11/66	2,495	1,145	3,640	X
	1000-M (MX-M, K)	16	T	2	25	06/74	8,316	6,487	14,803	NA
	1000-E (MX-E)	16	T	14	40	01/77	9,263	9,237	18,500	NA
	1000-F	16	T	18	55	09/78	3,601	2,226	5,827	NA
	1000-L, XL	16	T	2	10	06/79	1,320	1,130	2,450	NA
	3000-I	16	S	100	200	06/79	1,420	880	2,300	X
	3000-II	16	S	100	200	11/72				X
continued on next page	3000-III	16	S	92	200	06/78	2,309	989	3,298	NA
	3000-33	16	S	58	135	01/79	713	306	1,019	NA

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Hewlett-Packard (continued)	3000-30	16	S	50	105	10/79	1,038	445	1,483	NA
	3000-40	16	S	40	52	11/81	92	40	132	NA
	3000-44	16	S	109	200	03/81	933	400	1,333	NA
	3000-64	16	S	200	300	01/82	0	0	0	NA
						TOTAL	41,225	28,110	69,335	
HIS-GE	30	8	T	7	35	05/69	225	50	275	X
	3010, 2	16	T	13	90	05/70	25	1	26	X
Honeywell	112	12	T	5	10	11/69	222	48	270	X
	116/316/416/516	16	T	8	62	10/66	2,405	1,295	3,700	X
	700 Series	16	T	16	65	06/72	2,114	1,811	3,925	X
	164X Series	16	T	144	440	12/69	20	8	28	X
	6/06	16	T	7	42	01/76				
	6/23	16	T	6	25	--/78				
	6/33	16	T	4	40	05/78				
	6/34	16	T	4	18	01/76				
	6/36	16	T	4	35	01/76	3,720	3,120	6,840	2,500
	6/30	16	T	23	33	02/81				
	6/31	16	T	20	35	02/81				
	6/32	16	T	26	48	02/81				
	6/34	16	T	30	57	02/81				
	6/38	16	T	25	88	02/81				
	6/43	16	S	7	110	01/77				
	6/47	16	S	19	160	08/78				
	6/53	16	S	19	145	05/78				
	6/57	16	S	44	225	--/78				
	6/48	16	S	33	116	02/81	4,160	3,340	7,500	2,200
	6/54	16	S	39	138	02/81				
	6/74	16	S	65	221	02/81				
	6/76	16	S	75	273	02/81				
	6/92	32	S	110	412	10/81	180	40	120	
	6/96	32	S	130	570	10/81				
						TOTAL	12,971	9,713	22,684	4,700
Information Technology, Inc.*	4900/10	16	T	10	20	10/65	25	0	25	X
IBM	Series/1	16	T	5	30	11/76	20,800	8,300	29,100	10,000
Intel	86/330	16	T	2	19	01/82	0	0	0	NA
Integrated Digital Products, Inc.	MiniMate	16	T	8	6	01/82	0	0	0	200
Intersil	LSI 8	12	T	3	7	07/80	18	18	36	NA
Keronix	IDS-16/8	16	T	4	5	04/74				X
	IDS-16/10	16	T	3	5	04/74	2,900	270	3,170	X
	IDS-16/12	16	T	3	4	04/74				X
Lear Siegler*	VDP-410	16	T	4	4	10/78	100	50	150	X
Lockheed Electronics Company, Inc.*	LEC-16	16	T	11	18	03/69	2,590	435	3,025	X
	SUE	16	T	6	11	09/72	2,878	472	3,350	X
						TOTAL	5,468	907	6,375	
Microdata Corp.	400	8	T	3	4	01/70	155	0	155	X
	800 Series	8	T	6	11	05/69	2,055	1,380	3,435	X
	1600	8	T	5	11	02/72	6,825	1,177	8,002	X
	3200/3230	16	S	8	14	03/74	115	110	225	X
	Micro One	8	M	1	3	11/74	800	120	920	X
						TOTAL	9,950	2,787	12,737	
Minicomp*	MD-708	8	T	5	7	08/70	50	0	50	X
Modular Computer Systems	Modcomp I	16	T	2	9	10/71	698	142	840	X
	Modcomp II	16	T	13	41	03/71	2,197	534	2,731	2
	Modcomp III	16	S	13	44	12/70	72	5	77	X
	Modcomp IV	16/32	S	48	100	05/74	339	130	469	X
	Classic 7810	16	T	8	25	05/79	397	37	434	NA
	Classic 7820	16/32	T	16	38	12/80	66	13	79	NA
	Classic 7830	16/32	S	29	55	09/79	262	41	303	NA
	Classic 7840	16/32	S	28	70	12/80	164	36	200	NA
	Classic 7860	16/32	S	38	100	01/78	152	59	211	NA
	Classic 7870	16/32	S	64	128	08/78	327	153	480	NA
						TOTAL	4,674	1,150	5,824	
Motorola Communications Division*	MDP-1000	8	T	8	19	02/69	75	0	75	X
New England Digital Corp.*	Able Series 40	16	T	8	10	06/77	100	25	125	X
	Able Series 60	16	T	10	12	06/78	75	10	85	X
						TOTAL	175	35	210	
Omnitec (Bit)*	480	8	T	6	17	12/66	195	3	198	X
	483	8	T	9	33	01/70	115	40	155	X
						TOTAL	310	43	353	
Onyx	C8002	16	T	19	19	05/80	700	400	1,100	1,200
Perkin-Elmer Corp.	1	8	T	4	11	09/70	210	77	287	X
	2, 3, 4, 5	16	T	9	21	05/67	614	153	767	X
	13, 15, 16, 18	16	T	15	33	09/69	14	14	28	X
	50, 55	16+1	T	7	33	04/72	133	40	173	X
	70	16	T	9	65	12/71	1,108	348	1,456	X
	74	16	T	3	34	02/73	300	56	356	X
	8085	16	T	15	50	07/72	70	18	88	X
	5/16	16	M	1	5	01/77	269	78	347	X
	6/16	16	T	7	15	01/76	1,896	750	2,646	150
	7/16	16	T	3	18	02/74	3,732	840	4,572	X
	8/16	16	T	11	25	01/77	745	196	941	200
	7/32	32	S	15	36	07/74	1,602	470	2,072	200
	8/32	32	S	62	160	06/75	748	281	1,029	150
	Series 16	16	T	7	22	04/79	652	195	847	300
	3220	32	S	34	100	05/79	582	351	933	300
	3210	32	S	50	80	09/81	18	11	29	500
	3230	32	S	65	150	03/81	92	81	173	300
	3240	32	S	100	192	10/79	219	79	298	400
	3250	32	S	150	190	02/82	0	0	0	NA
						TOTAL	13,004	4,038	17,042	2,500

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Plexus Computers, Inc.	P/25	16	T	19	19	06/82	0	0	0	NA
	P/40	16	S	42	40	09/81	10	2	12	NA
						TOTAL	10	2	12	
Point 4 Data Corp.[b]	Point 4 Mark 5	16	T	5	7	03/79	2,550	760	3,310	1,200
	Point 4 Mark 3	16	T	3	4	05/81	125	105	230	1,800
	Point 4 Mark 8	16	T	6	8	11/81	18	6	24	400
						TOTAL	2,693	871	3,564	3,400
Prime Computer	100	16	T	6	12	04/73				X
	200	16	T	7	22	11/72				X
	300	16	S	12	58	09/73	1,500	1,340	2,840	X
	400	16	S	62	207	06/76				X
	500	16	S	126	330	06/76				X
	150 II	32	S	54	65	06 80				
	250 II	32	S	50	75	06/80				
	350	16 32	S	31	116	07 78				
	450	16/32	S	50	75	02 79				
	550	16/32	S	70	105	02/79	2,782	1,828	4,610	2,000
	550 II	16/32	S	75	110	07/81				
	650	16/32	S	95	165	02/79				
	750	32	S	130	200	07/79				
	850	32	S	275	370	07/81				
						TOTAL	4,282	3,168	7,450	2,000
Raytheon Data Systems	703	16	T	13	23	10/66	179	33	212	X
	704	16	T	10	18	03/70	700	200	900	X
	706	16	T	19	30	05/69	75	17	92	X
	RDS 500	16	S	17	21	12/73	1,153	272	1,425	NA
	RDS 550	16	S	14	14	10/80	212	0	212	NA
						TOTAL	2,319	522	2,841	
Redcor Corp.*	RC 70	16+2	T	15	30	07/68	100	40	140	X
SCI Systems, Inc.	Mercury 3	16	T	6	13	--/78	630	70	700	NA
Sperry-Univac	5201	16	T	6	13	09/68	330	170	500	X
	620/a	16	T		75	12/65	120	30	150	X
	520/f, f-100	16	T	10	23	06/70	470	220	690	X
	620i	16/18	T	10	20	12/65	920	380	1,300	X
	620/L+100C	16	T	5	12	02/71	720	320	1,040	X
	620/L-100	16	T	6	14	06/72	1,095	554	1,649	X
	A620/i, R622/i	16/18	T	15	29	06/69	185	80	265	5
	V-72	16	T	10	45	02/74	1,130	453	1,583	20
	V-73	16	S	16	45	11/72	1,190	530	1,720	X
	V-74	16	S	40	80	05/74	210	90	300	X
	V-75	16	S	39	80	08/75	120	50	170	X
	V-76	16	S	8	16	01/76	754	329	1,083	10
	V-77-200	16	M	2	5	01 77	977	371	1,348	280
	V-77-400	16	T	5	28	12/76	326	235	561	X
	V-77-500	16	S	30	60	03/81	100	100	200	300
	V-77-600	16	S	18	65	03/77	1,263	510	1,773	460
	V-77-700	16	S	34	90	03/81	50	50	100	300
	V-77-800	16	S	22	95	03/79	630	416	1,046	575
						TOTAL	10,590	4,888	15,478	1,950
Stratus Computer, Inc.	Stratus/32	32	S	123	200	02/82	0	0	0	38
Systems Computer Corp.*	1000	8	T	1	4	01/71	400	200	600	X
Systems Engineering Laboratories	32/30, 35	32	S	30	80	09/76	180	60	240	
	32/55, 57	32	S	50	125	08/75	570	175	745	
	32/75, 77	32	S	70	150	03/78	900	190	1,090	950
	32/27	32	S	25	60	02/81	100	65	165	
	32/87	32	S	250	350	11/81	25	5	30	
						TOTAL	1,775	495	2,270	950
Tandem Computer, Inc.	Non Stop	16	S	95	140	05/76	2,202	737	2,939	NA
	Non Stop II	16	S	144	200	01/81				
Telefile Computer Products	TCP-16/5	16	T	12	15	09/77	170	70	240	60
Texas Instruments	960-A/B	16	T	14	30	12/71	3,900	1,850	5,750	X
	980-A/B	16	S	17	40	10 72	3,950	1,750	5,700	X
	990/4	16	M	1	8	06/76	7,705	2,735	10,440	NA
	990/10	16	T	20	25	03/76	15,310	6,490	21,800	NA
	990/5	16	M	3	8	03/79	3,090	1,600	4,690	NA
	990/12	16	S	29	70	11/79	1,610	670	2,280	NA
	DS 990 Model 1	16	M	11	16	05/79	3,625	1,525	5,150	NA
	770, 771	16	M	7	12	05/79				NA
						TOTAL	39,190	16,620	55,810	
Unicom, Inc.*	CP-8	8	T	3	8	02/70	343	165	508	X
Unicomp*	Comp-16	16	T	11	29	06/70	26	0	26	X
	Comp-18	18	T	12	38	08/70	38	0	38	X
						TOTAL	64	0	64	
Westinghouse Electric	P-50	14	T	16	23	08/64	182	40	222	X
	P-2000	16	T	10	27	08 69	111	90	201	X
	2500F	16	T	10	30	11/71	339	133	472	5
						TOTAL	632	263	895	5
Xerox*	CE-16, 16A	16	T	8	23	06/69	35	10	45	X
	Sigma-2	16	T	24	125	12/66	170	80	250	X
						TOTAL	205	90	295	
							U.S.	International	World	
TOTAL							567,916	277,861	845,777	

NOTES: a) Two Pi Corp. was purchased by Four-Phase Systems, Inc., during 1980.
b) Corporate name changed from Educational Data Systems, March 1, 1980.
*) Not currently active in manufacturing or marketing minicomputers.
NA) Data is not available.
X) Indicates minicomputer models not in new production.

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• AMDAHL ENTERS STORAGE BUSINESS. After attempts to merge with Memorex and STC failed, Amdahl has, as expected, looked to Fujitsu for its peripheral products. First out the door will be an IBM-compatible version of Fujitsu's popular 10.5 inch Winchester, which offers 3350-type capacity, but has densities that approach the 3380. The 6280 drive will be marketed to both Amdahl and non-Amdahl customers and shipments have already begun. The peripheral controller being used is also made by Fujitsu.

• GEISCO PICKS IBM PC. General Electric Information Services Company will purchase some $10 million worth of IBM's Personal Computers for use by GEISCO clients. The desktops will be used in conjuction with GEISCO's teleprocessing and data base services. The GEISCO network is used by 6,000 customers in 750 cities around the world. Links to Apple IIs and TRS-80s are also available.

• NCR ENTERS 32-BIT CHIP RACE. As evidence that it is serious about the merchant semiconductor business, the Dayton manufacturer will be among the first to offer a 32-bit microprocessor. NCR claims that the NCR/32 can replace small and medium-sized mainframes since it has emulator and virtual machine capabilities that will allow it to run existing software. The pitch will be that it combines the best of VLSI with three generations of mainframe experience. NCR claims the /32 will have one of the fastest clock times in the industry; memory management and floating point support chips, and a high-speed (up to 50 MB per second) bus will also be available. Samples will be available in the first quarter of 1983, with volume shipments following in the second quarter.

• HITACHI CLAIMS WORLD'S FASTEST SUPERCOMPUTER. Claiming a top speed of 630 million floating point operations per second (630 Mflops), Hitachi's S-810 family will hit the Japanese market in early 1983; no plans for international marketing have been announced. Fujitsu claims 500 Mflops while the Cray X-MP and CDC 205 are rated at 400 Mflops. NEC is expected to join the race soon.

• CRAY SLASHES SUPERCOMPUTER PRICES. In response to the entrance of both Fujitsu and Hitachi and using a MOS-based version of the Cray-1/S, Cray has cut its prices in half. The new Cray-1/M prices will range fron $4 million to $7 million, compared to $8.5-$13.3 million for the Cray-1/S. Prices for the top of the line Cray X-MP have been cut by about 20% to $9- to $11 million from the previous $11.4-$14.5 million range.

• MITEL SHOWS ITS EXECUTIVE WORKSTATION. In what will be the start of a series of new workstations from PBX vendors, Mitel has combined voice and data services in its Kontact workstation. Kontact is designed to handle electronic mail, time management, financial planning, data communications and word processing with traditional voice/PBX capabilities. Mitel's efforts have taken on new import since the announcement of its cooperation with IBM for PBX/local network technology (see EDP/IR, Vol.18, No.8, page 8).

• IBM TO BUY INTEL 64K RAM TECHNOLOGY. Despite the dominance of Motorola and Texas Instruments in the U.S. 64K RAM market, IBM has looked to Intel for HMOS tapes and process know-how. Though IBM uses its own 64K RAMS in its 4300s and System/38s, those RAMS are believed to be too slow for both large machines and the small systems coming on line. Intel is also IBM's chief microprocessor supplier for its Personal Computer, Displaywriter, and Datamaster.

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REVIEW & FORECAST
Part I

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

MOLLY UPTON, EDITOR JUNE 3, 1981 ● VOL.17,NO.2 P.J. MCGOVERN,PUBLISHER

DESKTOPS' GROWTH UNLEASHED; SMALL BUSINESS COMPUTERS REINED IN BY ECONOMY

Despite the blurring of lines between the desktop and small business computers, the market seems to perceive a difference; the popularity of desktops continues unabated while shipments of small business computers are affected by both the economy and product life cycles.

It may be only a slight exaggeration to say that desktops may inherit the earth. Worldwide unit shipments by U.S. makers and international manufacturers with U.S.-based sales offices should grow at a compound rate of 32.7% between 1980 and 1985 -- from 456,000 units to 1.9 million units.

Significantly, the value of desktop shipments by 1982 will exceed the value of annual small business computer shipments. As of 1981, IDC is including independent peripherals in the value of shipments, which will jump from a 50% annual growth rate in 1980 to a 93% rate in 1981.

For those who think desktops are still small potatoes, the worldwide installed value of desktops from U.S. manufacturers was $4 billion in 1980, 40% of the size of small business computers, and will grow to $41.8 billion in 1985, surpassing the value of installed small business computers.

It's a different story for small business computers (SBC). The forecast for worldwide shipments of U.S. based manufacturers' SBCs calls for a more subdued compound rate of 18.6% between 1980 and 1985, 67,000 units to 157,100 units. The value of those shipments will grow at a 20% compound rate from $3.2 billion to $8.2 billion.

	Small Business Computers		Desktops	
	1980	1985	1980	1985
No. Shipments	67,000	157,100	456,000	1,874,000
Value Shipments	$3.2B	$8.2B	$1.7B	$12.9B

While the figures bode growth for both sectors, they include business that will be garnered by Japanese firms having U.S. bases. Thus it's not clear what part of the pie the Japanese will grab.

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VALUE OF WORLDWIDE SHIPMENTS -- DESKTOP AND SMALL BUSINESS COMPUTERS
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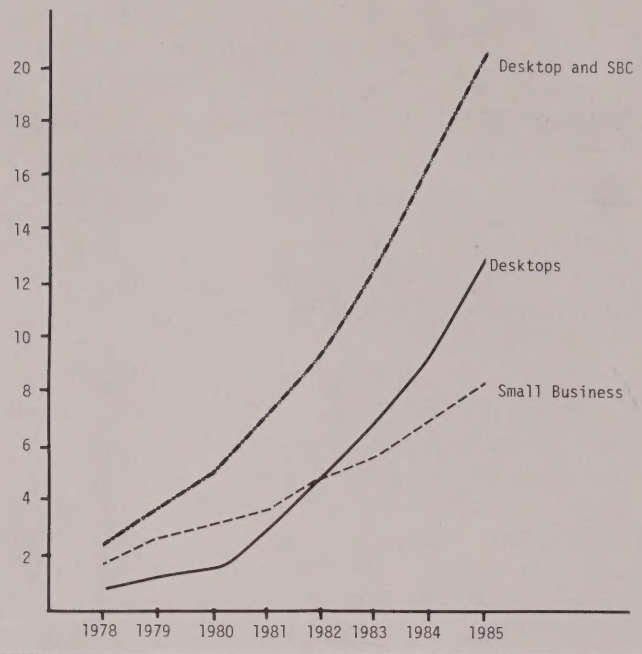

With the popularity of some particular operating systems, the Japanese incursion into this market is all but assured. Products merely have to be CP/M compatible to be on an almost equal footing with much of the rest of the gang. And because much of the software comes from independents, the Japanese can contract with houses such as Peachtree to construct software for their gear that is equivalent to software on other brands. In general, the Japanese have decided to peddle hardware and buy the software. Software will indeed make a difference in this product area as well as in others.

The lines are becoming admittedly blurry between desktops and small business computers. The lack of distinction becomes astounding when one considers that many of the makers of both desktops and SBCs are moving toward 16-bit CPU chips. IDC defines desktop as a system that is: microprocessor-based with its own power supply and encasement (not a board or kit), uses a high level language, and is able to attach peripherals. Its basic system prices usually range between $1,000 and $10,000.

1980 WORLDWIDE DESKTOP UNIT SHIPMENTS OF U.S. VENDORS
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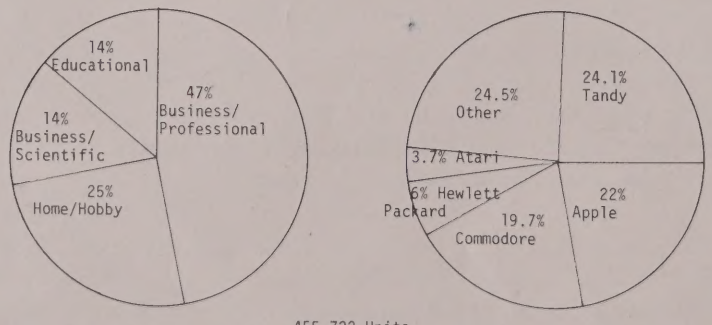

455,722 Units

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The fastest growing desktop sectors, respectively, and worldwide compound shipment rates from 1980 to 1985, are: business/professional, 39.2%; scientific, 34.1%; educational, 25.3%; and home/hobby, 19.9%. IDC this year increased its estimate of demand from the educational market.

Desktop shipment growth internationally and domestically will be at about the same compound rate between 1980 and 1985, 32% to 33%. Thus the U.S. installed base will continue to be about 70% of the worldwide base.

Tandy still leads the pack with over 35% of the U.S. installed base. The dollar value leader is Hewlett-Packard, which is known for its 9800 desktop family with an upper end that has price tags in the $20K range. Tandy maintained its lead in 1980 with 30% of unit shipments to the U.S. market but Apple garnered the Number One slot with 18% of the dollar value of shipments.

The desktop arena is a market with nearly 80 participants, whose orientations range from that of IBM to that of Mattel. And the capabilities of these systems increase almost weekly with the addition of mini Winchester disks, operating systems that will handle multiple users on systems networked together, and more user-oriented software.

Remember, 1980 was the year when a desktop company, Apple, captured the hearts and pocketbooks of Mr. Everyman and woman when it went public. The public demand for the stock before issuance was incredible. If nothing else, Apple has impacted the public's consciousness about computers. No small mission. Now Apple has found there are some slippery stones to negotiate over the brook separating small, single product companies from larger corporations.

Small business feels economy

The small business sector's growth is determined in large part by the product cycle of IBM's General Systems Division as well as by the economy.

IDC defines a small business computer as: a computer with internally stored data and instructions, at least 4K of memory that is user programmable and is configured with peripherals and applications software. Prices are generally between $20,000 and $100,000 and systems are targeted at business-related applications.

The growth rate of worldwide small business shipments slammed on the brakes in 1980, when it crawled to about 15% compared with the stellar performance in 1979 when it hit nearly 60%. Key factors contributing to the slower rate were the worldwide slumping economy, including U.S. high interest rates, and the fact that IBM began shipping its System/38 (not an SBC), in lieu of which users had previously been taking System/34s. In 1981 small business computer shipments worldwide should rebound to 20% reflecting:

- Pent-up demand carried over from 1980.
- Many products in the volume shipment part of their life cycles.
- Development of easy to use, industry specific software.

The growth rate worldwide over the next 5 years will be in the 18% to 19% range, with the international market showing a faster track record.

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SMALL BUSINESS COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)[a]

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1975	10,600	16,800	400	0.7
1976	22,300	39,100	870	1.6
1977	33,100	72,200	1,280	2.8
1978	42,300	113,000	1,800	4.6
1979	58,400	167,000	2,830	7.3
1980	67,000	230,300	3,240	10.3
1981	80,100	304,500	3,940	14.1
1982	94,600	390,700	4,690	18.4
1983	113,200	490,700	5,660	23.5
1984	133,900	605,100	6,830	29.4
1985	157,100	749,300	8,150	37.0
		UNITED STATES		
1975	7,900	12,400	300	0.5
1976	14,700	27,100	570	1.1
1977	21,700	48,800	830	1.9
1978	26,500	73,800	1,150	3.0
1979	34,200	104,300	1,720	4.6
1980	38,700	139,800	1,930	6.4
1981	46,100	181,800	2,340	8.6
1982	53,500	230,100	2,750	11.1
1983	63,100	285,400	3,260	14.0
1984	73,800	348,200	3,890	17.4
1985	85,600	425,500	4,640	21.7
		INTERNATIONAL		
1975	2,700	4,400	100	0.2
1976	7,600	12,000	300	0.5
1977	11,400	23,400	450	0.9
1978	15,800	39,200	650	1.6
1979	24,200	62,700	1,110	2.7
1980	28,300	90,500	1,310	3.9
1981	34,000	122,700	1,600	5.5
1982	41,100	160,600	1,940	7.3
1983	50,100	205,300	2,400	9.5
1984	60,100	256,900	2,940	12.0
1985	71,500	323,800	3,510	15.3

[a]International manufacturers with U.S.-based sales offices are counted in the U.S. totals, but not international.

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DESKTOP COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)[a]

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1975	4,000	7,000	50	0.1
1976	9,000	16,000	128	0.2
1977	32,000	48,000	247	0.5
1978	164,000	212,000	646	1.1
1979	289,000	501,000	1,165	2.3
1980	456,000	957,000	1,746	4.1
1981	637,000	1,594,000	3,363	7.4
1982	869,000	2,463,000	4,933	12.4
1983	1,149,000	3,612,000	6,985	19.4
1984	1,482,000	5,094,000	9,607	28.9
1985	1,874,000	6,968,000	12,900	41.8
		UNITED STATES		
1975	2,000	4,000	25	*
1976	4,000	8,000	59	0.1
1977	24,000	32,000	171	0.3
1978	128,000	160,000	435	0.7
1979	196,000	356,000	735	1.5
1980	327,000	683,000	1,112	2.6
1981	463,000	1,146,000	2,430	5.0
1982	631,000	1,777,000	3,563	8.6
1983	828,000	2,605,000	5,004	13.6
1984	1,058,000	3,663,000	6,817	20.4
1985	1,324,000	4,987,000	9,056	29.4
		INTERNATIONAL		
1975	2,000	3,000	25	*
1976	5,000	8,000	69	0.1
1977	8,000	16,000	76	0.2
1978	36,000	52,000	211	0.4
1979	93,000	145,000	430	0.8
1980	129,000	274,000	634	1.5
1981	174,000	448,000	933	2.4
1982	238,000	686,000	1,370	3.8
1983	321,000	1,007,000	1,981	5.8
1984	424,000	1,431,000	2,790	8.5
1985	550,000	1,981,000	3,844	12.4

*Less than $.05

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SMALL BUSINESS COMPUTER CENSUS

The categorization of certain computers as "small business computers" is based on marketplace definitions as perceived by IDC. SBCs are those small general-purpose computers marketed to smaller businesses, first-time users, and increasingly to small units of large organizations. They include offerings from the major mainframers (such as IBM's System/32 and 34); products such as DEC's Datasystem/300 from the minimakers but aimed at commercial first-time users; equipment from firms (such as Qantel) that manufacture only SBCs; and products from companies that market systems assembled from others' minicomputers (i.e., systems houses).

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1981 INSTALLATION
Advanced Information Design*	System 3000	Interdata X/16		24	39	3/75	41	0	41	X
A.M. Jacquard Systems	J 100	NS IMP-16		19	46	8/75	1,220	1,080	2,300	800
	J 500	J 500		12	16	12/78	510	770	1,280	1,080
	Total						1,730	1,850	3,580	1,880
Anderson Jacobson*	1400	AJ 1400	a	16	22	1/70	260	15	275	X
	1520 Series	AJ 1500		19	21	7/77	200	25	225	X
	1560 Series	AJ 1500		30	35	7/77	60	3	63	X
	Total						520	43	563	
Applied Computer Systems*	Smart Alec	8080 A		12	13	1/77	47	17	64	X
Applied Data Communications	Event	Event 2000		13	20	2/77	151	12	163	X
	Clinic 2	Event 2000		19	23	6/79	20	0	20	X
	Event 3000	8080 A		22	22	12/79	6	0	6	NA
	League Master	8080 A		23	23	/80	2	0	2	X
	Total						179	12	191	
Applied Data Processing, Inc.*	Resource 50	Nova 3/4		31	52	9/79	1	0	1	X
	Resource 100	Nova 3/12		41	72	6/79	16	0	16	X
	Total						17	0	17	X
Applied Digital Data Systems, Inc.*	ADDS/Vantage	8080		11	14	7/76	550	400	950	X
Astrocom	Series 760	Z80		16	20	6/79	10	0	10	NA
Ball Computer Products*	DASL	Nova 2/10		38	40	6/75	3	0	3	X
Basic Four Corporation	200	BFC 1340		25	29	2/78	383	512	895	NA
	350	BFC 1300, Microdata	b	34	34	9/71	500	576	1,076	X
	400	BFC 1300, Microdata	b	37	45	9/71	1,712	1,739	3,451	X
	410	BFC 1300		33	41	10/78	1,146	1,378	2,524	NA
	500	BFC 1300, Microdata	b	39	50	7/72	100	82	182	X
	510	BFC 1345		44	61	/80	20	10	30	NA
	600	BFC 1300, Microdata	b	51	65	3/75	300	308	608	X
	610	BFC 1320		51	66	1/78	1,197	879	2,076	NA
	700	BFC 1320		115	130	/77	109	99	208	X
	730	BFC 1350		95	124	6/78	380	270	650	NA
	Total						5,847	5,853	11,700	
Basic Time	B-100	Digidyne		16	16	7/79	110	10	120	NA
	B-200	Digidyne		20	20	11/79	25	5	30	NA
	Total						135	15	150	
Billings Computer Company*	BC 104	8080A		12	22	/77	400	0	400	X
Binary Data Systems	Award	Eclipse S/130, S/140,		150	250	/75	10	0	10	3
	Hemoshare	Eclipse S/130		125	150	/78	6	0	6	3
	GBS	Eclipse S/130, S/140, Nova 4		75	125	/75	40	0	40	X
	HemoCare	Eclipse S/140		125	150	3/81	0	0	0	6
	Total						56	0	56	
BRD, Inc.*	Dolphin	6800		18	20	6/77	400	30	430	X
	Purpose	6800		10	13	1/78	160	5	165	X
	Total						560	35	595	
Briareus	Briareus	EDS Point 4		23	38	1/76	115	0	115	55
Broadcast Management Concept	Mesa Two	Nova 4	c	50	73	4/78	60	0	60	30
Burroughs	B 80	B 80		17	29	11/76	6,100	9,900	16,000	3,100
	B 90	B 90		18	33	12/79				
	B 700	B 700		26	68	3/73	2,200	1,700	3,900	X
	B 800	B 800		35	51	5/77	4,200	2,400	6,600	3,400
	B 900	B 900		61	76	8/80	150	100	250	300
	Total						12,650	14,100	26,750	6,800
Business Controls Corporation	System 80	PDP-8/a		25	40	6/71	60	0	60	
	Business Control System	PDP-11/23/34/44/70, VAX		40	80	6/75	101	12	113	
							161	12	173	
Business Systems Products*	Adviser	C.A. Syfa		42	50	7/76	111	0	111	
Cado	Cado System 20	Intel 8080		12	16	1/78	500	150	650	X
	Cado System 40	Intel 8080		18	20	4/76	250	60	310	X
	Cado System 20/4, 20/24	Intel 8085		16	27	6/78	2,415	439	2,854	
	Cado System 40/4, 40/44	Intel 8085		20	37	6/78	65	375	440	2,800
	Cado System 20/2, 20/22	Intel 8085		15	16	7/79	206	205	411	
	Cado CAT System	C.A.T.		14	29	5/80	245	20	265	
	Total						3,681	1,249	4,930	2,800

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Cascade Data, Inc.	80/20, 30, 40	Concept		28	42	1/70	50	0	50	X
	Concept II	Concept		27	35	6/75				NA
	Concept III	Concept		32	39	1/78	334	15	349	NA
	Concept IV	Concept		17	19	4/78				NA
	Total						384	15	399	
Centurion Computer Corp.	Centurion I-A	CC-205	d	18	19	/77	60	0	60	X
	Centurion II-A	CC-205		27	30	/75	95	0	95	X
	Centurion III	CC-205		30	36	/74	600	45	645	135
	Centurion Ser. 100	CC-205		15	15	/79	124	20	144	35
	Centurion Ser. 200	CC-205		27	27	/79	116	10	126	75
	Centurion Ser. 6000	CPU 6		18	35	1/80	100	20	120	100
	Total						1,095	95	1,190	345
Century Computer Corp.	C-400	C-200, 400		34	45	3/75	204	64	268	NA
	C-700	C-200, 400		38	55	6/76	78	11	89	40
	C-900	C-400		27	40	4/77	127	67	194	NA
	C-1000	C-400		40	50	6/77	72	10	82	25
	Opus III	C-200		15	22	2/71	560	110	670	X
	Total						1,041	262	1,303	
Cincinnati Milacron*	George 40	CIP/2200B		16	20	2/77				X
	George 60	CIP/2200B		26	34	/76				X
	George 70	CIP/2200B		26	35	/76	670	150	820	X
	George 80	CIP/4400		43	60	12/76				X
	Other	CIP/2200B		23	34	/74				X
Clary Data Systems*	404	Clary		6	30	1/70	100	32	132	X
Complete Computer Corp.	10, 11, 12	Nova 3/12		34	44	3/74	22	0	22	9
	14, 16, 18	Nova 3/12, Nova 4/X 45		58	10/76	29	0	29	X	
	20, 22, 24	Nova 3/12, Nova 4X		58	74	9/77	8	0	8	X
	40, 44	Nova 4X		48	65	1/80	18	0	18	4
	Total						77	0	77	13
Compucorp*	402	Compucorp 3000		13	15	1/76	15	455	470	X
	450	Compucorp 3000		20	22	4/76	40	115	155	X
	Total						55	570	625	
Computer Hardware, Inc.	2120	CHI		15	50	5/75	10	0	10	X
	2130 C	CHI C		32	75	7/74	350	4	354	4
	2130 D	CHI D		44	120	1/78	10	1	11	3
	3230	CHI		15	50	6/76	100	0	100	48
	4210	CHI		13	13	9/77	4	0	4	2
	4250	CHI		37	45	6/78	7	0	7	1
	Total						481	5	486	58
Computer Interactions Inc.	Compo II-8	PDP-8/e,f,m		40	55	11/72	240	0	240	NA
	Compo II-11	PDP-11		40	55	6/75	230	0	230	NA
	Word Pro II	PDP-8a, Nova, HP		13	19	2/77	350	0	350	NA
	Total						820	0	820	
Data General	CS/10	MicroNova		11	13	11/80	30	20	50	NA
	CS/20	MicroNova		11	20	7/78	180	120	300	NA
	CS/30	MicroNova		21	25	8/79	700	200	900	NA
	CS/40	Nova 3/12		33	40	10/77	600	400	1,000	NA
	CS/50, CB50	MicroNova 4S, 4X		32	65	/80	300	100	400	NA
	CS/60	Eclipse		40	75	7/78	300	100	400	NA
	CS/70	Eclipse		36	43	11/80	24	16	40	NA
	Design Data EC300	Eclipse C/300	e	60	150	3/76	50	10	60	X
	Design Data N312	Nova 3/12	e	31	75	8/75	120	10	130	X
	Synergist 1500	MicroNova	f	8	24	/76	45	5	50	NA
	Synergist 1550	MicroNova	f	14	21	7/78	65	5	70	NA
	Synergist 2500	Nova 3/12	f	27	40	/76	320	15	335	NA
	Synergist 3700	Nova 3/D	f	40	60	/76	40	5	45	NA
	Total						2,774	1,006	3,780	
Decision Data Computer Corp.*	System/4	System/4		23	37	8/76	15	0	15	X
Diablo Systems, Inc.	3200	8080	g	19	23	1/77	1,600	2,100	3,700	NA
Digital Equipment Corp.	Datasystem 300	PDP-8, PDP-11		14	30	/72	7,900	5,100	13,000	3,100
	Datasystem 500	PDP-11		58	115	/72	1,750	1,750	3,500	2,300
	DEC Station 78	PDP-8		8	11	9/78	1,400	900	2,300	1,100
	DEC Station 88	PDP-8A		12	15	3/78				
	Data System 700	VAX 11/750		90	111	1/81	0	0	0	NA
	Total						11,050	1,750	18,800	
Digital Systems Corp.	Galaxy/5	Galaxy/5		90	120	1/76	32	0	32	
	Galaxy/3	Galaxy/3		50	65	1/80	4	0	4	12
	Total						36	0	36	
Dimis, Inc.	Total 100	Modcomp II, Classic	h	110	155	6/74	44	0	44	NA
Display Data Corp.	Insight	Microdata 1600/30		38	59	1/74	1,000	12	1,012	400
	ELS System	Microdata 1600/30		27	33	5/78	250	0	250	X
	Total						1,250	12	1,262	400
DTC	Task Master	8080		17	19	9/78	25	90	115	X
	Micro 210	8085		33	33	8/79	15	30	45	NA
	Total						40	120	160	
Evolution Computer Systems Corp.	Series I	Multi 6	i	65	77	11/73	206	28	234	X
	Series II	Multi 6		88	97	10/77	150	10	160	150
	Total						356	38	394	150
Financial Computer Corp.*	System 111/6	System III		19	25	9/77	28	0	28	X
	System 111/8	System III		23	32	9/77	22	0	22	X
	System 111/10	System III		30	45	1/75	440	55	495	X
	Total						490	55	545	
Gemini Information Systems	Gispac/1	Series I		54	66	4/78	25	0	25	12
	Gispac/16	Perkin-Elmer/16		54	55	4/76	42	0	42	4
	Gispac/32	Perkin-Elmer/32		97	110	4/76	38	0	38	25
	Total						105	0	105	41
General Automation	OM-130/2	SPC-16/45		28	28	12/74	150	350	500	X
	DM-130	SPC-16/45		30	38	12/74	80	180	260	X
	DM-140	SPC-16/65		48	80	1/75	7	18	25	X
	440-DS	GA-16/440		38	70	1/76	35	65	100	X
	460-DS	GA-16/460		35	80	11/78	10	30	40	X
	InstaCode	GA-16/230		34	34	6/80	2	0	2	30
	Total						284	643	927	30
General Information Systems	GIS-350 ABLE	PDP-11/34		36	40	1/76	20	0	20	X

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General Robotics Corp.	Gemini Series	LSI-11		10	21	7/76	200	200	400	200
	Tristar Series	LSI-11		11	22	7/76	100	100	200	100
	Pegasus Series	LSI-11		18	39	9/77	150	150	300	150
	Scorpio	LSI-11		7	10	7/81	0	0	0	200
	Total						450	450	900	650
GRI Computer Corp.	System 99	GRI 99/50		30	35	11/74	196	88	284	X
	System 99/E	GRI 99/52		43	50	11/77	35	15	50	X
	GRIP	GRI		30	30	11/78	25	0	25	100
	Total						256	103	359	100
Hewlett-Packard	HP250	HP250		24	39	9/78	800	1,200	2,000	NA
	HP300	HP300		30	55	9/78	180	270	450	NA
	Total						980	1,470	2,450	
Honeywell	PPS 6/X	DPS 6/X		21	NA	/81	0	0	0	NA
Infotecs	IMP	IM 6100		10	15	9/77	607	104	711	750
	CC2	IM 6100		16	22	1/80	550	40	590	
	Total						1,157	144	1,301	
IBM	System/32	IBM S/32	j	27	42	3/75	6,800	5,000	11,800	X
	System/34	IBM S/34		35	66	12/77	31,000	15,000	46,000	18,000
	Total						37,800	20,000	57,800	18,000
International Computing Corp.*	System 95/99	Nova 2/10		24	35	10/72	9	0	9	X
Kalbro Computer Services	BDS 500	Microdata 1600	k	30	48	3/77	40	0	40	
	BDS 1000	Microdata 1600		35	55	6/72	80	0	80	35
	BDS 2000	Microdata 1600		43	73	10/73	93	0	93	
	BDS 4000	Microdata 1600		51	85	10/79	8	0	8	
	Total						221	0	221	
Keydata	Unity Series	Nova 3/4, 3/12, 3D		48	80	4/79	35	1	36	NA
Lockheed Electronics Company, Inc.	System III	Lockhead SUE		30	50	1/73	465	130	595	X
Logical Machine Corp.	ADAM I	ADAM		30	35	4/75	479	547	1,026	NA
	TINA	TINA		18	20	12/78	287	829	1,116	NA
	ADAM II	ADAM		25	30	10/79	38	220	258	NA
	GOLIATH	GOLIATH		35	37	11/80	2	15	17	NA
	Total						806	1,611	2,417	
Martin Wolfe, Inc.*	Mesa Two 7000	DCC-116		54	81	12/71	140	0	140	X
	Mesa Two 4000	DCC-116		62	93	2/76	3	0	3	X
	Total						143	0	143	
Mercator Business Systems	4000	8086		22	23	10/80	15	50	65	200
	3000	8088		15	16	4/81	0	0	0	400
	Total						15	50	65	600
Microdata	Reality	Microdata 1600		32	60	12/73	2,650	510	3,160	NA
	Reality 2000	Microdata 1600		32	36	6/79	80	10	90	NA
	Reality 4000	Microdata 1600		38	50	6/79	410	60	470	NA
	Reality 6000	Microdata 1600		62	76	6/79	700	92	792	NA
	Reality 8000	Microdata 1600		85	95	2/80	212	40	252	NA
	Total						4,052	712	4,764	
Microstar, Inc.*	Microstar I	Zilog Z80		13	17	12/78	5	0	5	X
	Microstar II	Zilog Z80		14	19	12/78				X
Microtech Business Systems, Inc.	System 50	Point 4		14,950	30,000	/80				
	System 100	Point 4		19,500	22,500	/80				
	System 200	Point 4		24,500	29,500	/77	175	0	175	25
	System 300	Point 4		33,500	38,000	/79				
	System 400	Point 4		49,500	55,000	/78				
Mini-Computer Systems, Inc.	Micos 100	Nova 3/4		34	40	8/77	130	170	300	NA
	Micos 200	Nova 3/12		40	60	/73	935	415	1,350	NA
	Micos 300	Dual Nova 3/12		100	140	1/79	6	4	10	NA
	Micos 75	Nova 3/4		26	26	9/79	18	16	34	X
	Micos 85	Nova 3/4		36	41	/80	22	28	50	X
							1,111	633	1,744	
Minutemen Computer Corp.	1774	Nova 3/4, 4/5		30	40	11/71	70	0	70	
	1775	Nova 3/12, 4/16		32	44	3/72	40	0	40	50
	1776	Nova 3/12, 4/16		35	59	3/72	40	0	40	
	1776/A	Nova 3/12, 4/16		35	65	5/77	45	0	45	
	Total						195	0	195	
Moore Business Systems	MBS 20/50	DS 990/1		18	22	12/79	220	2	222	740
	MBS 20/80	ONYX C8001		19	25	9/80	22	0	22	180
	Total						242	2	244	920
Mylee Digital Sciences, Inc.	3000 Series	Mylee 3G		29	60	5/76	164	0	164	18
NCR Corp.	8130	NCR		19	23	3/78				
	8140	NCR		15	16	5/80	1,360	3,000	4,360	2,100
	8150	NCR		27	34	2/77				
	9020	NCR		NA	57	/81				
	9040	NCR		NA	96	/81	0	0	0	NA
	9050	NCR		NA	301	/81				
	8200	NCR		33	63	9/74				
	8230/31	NCR		27	42	6/77	6,640	7,200	13,840	4,500
	8250/51	NCR		29	60	12/76				
	Total						8,000	10,200	18,200	6,600
NEC (U.S. Only)	210	NEC		16	17	6/79	50	-	50	50
	230	NEC		24	40	6/79	300	-	300	300
	250	NEC		34	73	6/79	150	-	150	100
	Total						500	-	500	450
Nixdorf Computer Corp. (U.S. Only)	8870/1	8013, 8015		11	32	/78	250	-	250	115
	8870/3	8033, 8035		19	40	1/81	0	-	0	170
	Total						250	-	250	285
Norfield Datasystems, Inc.*	Nova-System	Nova		35	50	6/73	20	0	20	X
Novell Data Systems, Inc.	Nexus I	Nexus		12	12	4/81	0	0	0	350
	Nexus II	Nexus		25	25	6/81	0	0	0	150
	Total						0	0	0	500

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AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	PROCESSOR MODEL	NOTES	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER INSTALLED IN U.S.	NUMBER INSTALLED OUTSIDE U.S.	TOTAL NUMBER INSTALLED	ORDERS FOR 1981 INSTALLATION
Prodigy Systems, Inc.	Prodigy 1	Z80-A		13	15	5/79	120	30	150	NA
	Prodigy 2	Z80-A		14	18	6/80				NA
Programmed Control Corp.	Prophet 21/1	TI 960-B		42	75	/72	40	0	40	1
	Prophet 21/2	TI 990/10		57	100	1/78	35	2	37	18
	Total						75	2	77	19
Q1 Corp.	Q1/LMC	Z80, 8080		10	21	2/74	575	75	650	NA
	Q1/LITE	Z80		6	24	2/77	510	400	910	NA
	Q1 Microlite	Z80		10	13	1/79	220	300	520	NA
	Q1 68000	68000		15	30	/81	0	0	0	NA
	Total						1,305	775	2,080	
Qantel	210, 110	Q29		12	17	11/77	200	600	800	100
	800/900	Q7		28	29	5/75	85	62	147	X
	950	Q7		28	33	11/75	600	240	840	X
	960	Q7.5		30	35	11/76	300	100	400	X
	970	Q29B		36	40	1/79	250	150	400	X
	1200	Q7		42	59	11/75	200	20	220	X
	1300	Q7.5		42	59	11/75	40	15	55	X
	1400-2	Q7.5		44	70	5/77	360	170	530	X
	1450-2	Q29B		45	80	1/79	200	50	250	X
	200 Series	Q29B		30	57	3/80	425	125	550	NA
	300 Series	Q29B		50	86	3/80	105	30	135	NA
							2,765	1,562	4,327	
Quodata Corp. (Educomp)	F-250, 500	PDP-8		15	30	/72	280	60	340	X
	F-660, 760, 820, 960	PDP-11		44	100	/75				X
	Q-620, 720, 750, 820, 850, 970	PDP-11		40	120	/80				65
	QDP/78	PDP-8		13	13	/77				X
	ECS/7800	PDP-8		10	11	/77				X
Randal Data Systems*	R-100 Series	Randal		14	17	10/75	257	13	270	X
	R-200 Series	Randal		24	30	10/76	382	0	382	X
	R-300 Series	Nova 2/10		34	45	6/74	27	0	27	X
	R-400 Series	Nova 2/10		36	45	6/74				X
	R-500 Series	Randal		42	47	10/77	45	0	45	X
	Total						711	13	724	
Retail Sciences, Inc.	Clerk 700	PE 5/16		19	19	10/78	18	5	23	NA
	Clerk 800	PE 5/16		25	25	4/79	25	15	40	NA
	Total						43	20	63	
Rexon Business Machines	RX15	8086		20	22	2/81	0	0	0	300
	RX20	8086		27	43	7/79	105	105	210	250
	RX30	8086		23	28	4/80	75	75	150	250
	Total						180	180	360	800
Reynolds & Reynolds	VIM III	BTI 5000		30	45	/78	1,650	297	1,947	NA
	Expansion 6000	Z80		35	67	5/81	0	0	0	NA
	Total						1,650	297	1,947	
Sentinel Computer Corp.	Sentinel Series	8086		21	38	7/79	220	114	334	350
A.O. Smith*	Mesa Two	Nova 3		58	58	5/77	10	0	10	X
Space Byte Computer*	DBM/1	8085		6	13	7/78	55	10	65	X
	DBM/2	Z80		13	15	6/79	10	0	10	X
	Total						65	10	75	
Span Management Systems*	TSS 2	IBM Series/1		31	31	/77	10	3	13	X
Sperry Univac	BC-7	Univac		22	45	4/77	1,435	700	2,135	690
STC Systems, Inc.	Ultimacc 2000	Nova 3/12		34	80	9/72	108	2	110	X
	Ultimacc 3010	Nova 3/D		55	112	1/75	108	2	110	X
	Ultimacc 3080	Nova 3/D		84	143	11/75	25	0	25	X
	STC System 4000	Nova 4		35	80	11/76	75	0	75	20
	STC System 5000	Nova 4X		40	200	11/76	25	0	25	20
	Total						341	4	345	40
Symcro Systems, Inc.	SB700	Z80		25	30	2/81	0	0	0	NA
Tri-Star, Inc.*	TTK-10	Nova 3/12		45	55	2/76	12	0	12	X
	TEK-80	Nova 3/12		52	67	4/76	4	0	4	X
	Total						16	0	16	
Vanguard Computer Systems, Inc.	V400	Raytheon RDS 500		45	52	6/77	2	0	2	X
	V500	Raytheon RDS 500		65	85	3/76	6	3	9	NA
	Total						8	3	11	
Wang	2200	2200		10	19	4/73	12,910	8,505	21,415	340
	2200 VP	2200 VP		11	26	9/76	6,615	4,410	11,025	4,780
	2200 MVP	2200 MVP				1/78				
	VS	2200 VS		33	114	10/77	1,560	1,040	2,600	1,840
	2200 LVP	2200 LVP		13	25	9/80	210	140	350	320
	2200 SVP	2200 LVP		10	14	9/80				
	Total						21,295	14,095	35,390	7,280
Wintex Computer Corp.	200 NS	Wintex		12	18	1/75	95	1	96	X
	MT 200	Wintex		10	20	10/79	36	0	36	45
	Total						131	1	132	45
Zilog	MCZ 1/70	Z80		18	18	1/80	90	60	150	200
Total Of Above							137,461	89,874	227,335	
Total Other Vendors							2,300	600	2,900	
TOTAL							139,761	90,474	230,235	

Notes:

(a) Includes installations of Eldorado 140.
(b) Used Microdata processors until 11/76.
(c) Corporate name changed from Automated Business Concepts, March 1, 1980.
(d) Corporate name changed from Warrex Computer Corporation when it was purchased by Electric Data Systems, January 29, 1981.
(e) Design Data was acquired by Data General in February 1977.
(f) Digital Computer Controls was acquired by Data General in early 1977.
(g) Marketed in the U.S. by Shasta General Systems.
(h) Rental price $3,000/month.
(i) Computer hardware division purchased from Pick & Associates during 1980.
(j) U.S. installation figures account for retirements.
(k) Northrop Data Systems was acquired by Kalbro Corporation in 1981.
(*) Not currently active in manufacturing or marketing small business computers.
(NA) Data is not available.
(X) Model not in new production.

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DESKTOP COMPUTER CENSUS

The Desktop Computer Census counts those computers which typically are small enough to be used on a desktop, and are found in a variety of end-user enviornments including business, home, hobby, personal, educqtional, and scientific. By IDC definition the Desktop Computer is microprocessor based, includes its own power supply and enclosure, has the capability for attaching output peripherals -- video screen and/or printer -- and can also attach storage devices such as floppy diskettes, tape cassettes, or in some cases fixed disks. The computer is programmable in BASIC or equivalent level language, and costs from les than $1,000 up to $15,000 in a basic configuration. Microcomputer boards and kits are not counted here.

AS OF JANUARY 1, 1981

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Algorithmics, Inc.	Alga-2100	Z80	9,900	14,000	1/78	39	1	40	100
Altos Computer Systems	ACS 8000-2	Z80	4,500	5,000	6/77	1,200	2,200	3,400	3,000
	ACS 8000-5	Z80	5,990	7,000	10/79	350	350	700	2,000
	ACS 8000-6	Z80	9,500	10,450	11/79	1,000	1,000	2,000	4,000
	ACS 8000-10	Z80	8,500	9,000	3/81	0	0	0	3,000
	Total					2,550	3,550	6,100	12,000
A.M. Jacquard Systems	J500	A.M. Jacquard	12,000	16,000	12/78	510	770	1,280	1,080
APF Electronics	IM 1	6800	400	1,115	11/79	7,500	0	7,500	NA
	SBS-2	6800	-	1,200	2/81	0	0	0	NA
Apple	Apple II	6502	1,330	2,500	5/77	124,500	32,500	157,000	NA
	Apple III	6502	4,240	6,000	11/80	1,000	100	1,100	NA
	Total					125,500	32,600	158,100	
Applied Digital Data Systems, Inc.	Multivision I, II, III	8085A	3,700	12,800	12/80	100	100	200	NA
Archives Incorporated	Archives Business System	Z80	6,500	6,500	1/80	450	50	500	4,500
Artec Electronics Inc.	Artec System	8085 A-2	6,300	7,300	11/80	11	1	12	NA
Atari	400	6502	550	550	9/79	25,000	0	25,000	NA
	800	6502	1,000	1,000	9/79				NA
Billings Computer Company	BC12FD	Z80	6,600	9,500	3/79	650	950	1,600	NA
	BC12DF2M	Z80	9,900	12,900	3/79				NA
BRD, Inc.*	Small Fry	6800	7,000	10,000	4/79	50	0	50	X
Canon	BX-3	6809	5,600	5,600	5/81	0	-	0	800
(U.S. Only)	CX-1	6809	3,995	7,000	5/81	0	-	0	800
	Total					0	-	0	1,600
Columbia Data Products, Inc.	500	Dual Z80-A	3,000	3,995	9/79	460	52	512	1,800
	900	Dual Z80-A	4,100	4,995	9/79	122	73	195	
	MX	Z80-A	2,195	2,495	12/79	18	36	54	300
	FX	Z80-A	4,495	4,495	2/80	33	14	47	110
	Total					633	175	808	2,210
Commodore	PET/CBM	6502	795	995	10/77	90,400	106,600	197,000	100,000
	VIC 20	6502	299	400	6/81	0	0	0	75,000
	8096	6502	NA	NA	7/81	0	0	0	NA
	Total					90,400	106,600	197,000	
Compal	8100	8080	12,000	12,000	12/76	400	10	410	0
	8200	Z80	12,500	14,000	1/80	250	0	250	400
	Total					650	10	660	400
Compucorp	625	Z80	5,000	8,500	6/77	200	500	700	X
	655	Z80	5,000	7,000	4/79	1,000	2,000	3,000	NA
	665	Z80	5,000	7,000	4/79	500	1,000	1,500	NA
	675	Z80	8,000	10,000	6/79	200	500	700	NA
	685	Z80	13,000	15,000	5/81	0	0	0	NA
	Total					1,900	4,000	5,900	
Computer Data Systems*	Versatile 4	8085	3,800	4,500	11/77	700	150	850	X
	Versatile 3B	8085	4,900	5,500	11/77	250	50	300	X
	Total					950	200	1,150	
Computer Hardware, Inc. (Business Machines)	4800	CHI	8,850	10,500	4/81	0	0	0	20
Computer Interface Technology	Pense System	Microengine	5,295	8,000	11/79	400	355	755	700
Computhink, Inc.	Minimax	6502	6,950	6,950	1/80	200	400	600	700
	Eagle 32	6800	5,800	9,000	5/81	0	0	0	300
	Total					200	400	600	1,000
Cromenco	System Three	Z80-A	5,995	10,943	8/77	7,700	800	8,500	6,000
	System Zero/D	Z80-A	2,995	4,990	12/80				
	System Zero	Z80-A	995	2,990	12/80				
Cyber Systems, Inc.	CYKEY 9910	Z80	7,000	9,000	3/81	0	0	0	500
Diablo Systems, Inc.	3000	8085	15,000	17,000	12/79	450	550	1,000	NA
	510	8085	12,000	12,000	4/80	150	0	150	NA
	Total					600	550	1,150	
Digilog, Inc.	1000	Z80A	3,995	6,495	11/80	5	0	5	NA
	2000	Dual Z80-A	8,400	8,400	9/80	100	0	100	NA
	7120	Dual Z80-A	8,400	8,400	3/79.	0	1,500	1,500	NA
	Total					105	1,500	1,605	

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Digital Equipment Corp.	Mini MINC	LSI-11	9,900	11,000	10/79	2,000	500	2,500	2,800
	Datasystem 150	LSI-11	10,900	15,000	3/79	900	700	1,600	1,200
	Total					2,900	1,200	4,100	4,000
Digital Microsystems	DCS-2	Z80-A	4,995	5,895	11/77	5,000	2,000	7,000	20
	DCS-2585	Z80-A	9,950	9,950	6/78	300	0	300	12
	DSC-3	Z80-A	5,495	15,000	11/80	35	15	50	750
	DSC-4	Z80-A	6,950	10,000	10/80	30	15	45	600
	Total					5,365	2,030	7,395	1,382
Durango Systems	F85	8085	9,950	12,536	10/78	1,100	1,100	2,200	1,200
Dynabyte	5100	Z80	2,295	3,000	/78	1,500	600	2,100	110
	5200	Z80	4,495	5,000	/78	1,100	480	1,580	1,000
	5300	Z80	5,995	7,000	/79	310	110	420	750
	5400	Z80	6,995	8,500	/79	380	200	580	100
	5800	Z80	17,995	23,000	/80	80	45	125	100
	5900	Z80	18,995	25,000	/80	100	110	210	145
	5500	Z80	10,995	14,000	/81	0	0	0	340
	5600	Z80	11,995	15,000	/81	0	0	0	780
	5700	Z80	14,995	18,000	/81	0	0	0	1,165
	Total					3,470	1,545	5,015	4,490
Exidy Systems, Inc.	Sorcerer	Z80	1,295	2,200	8/78	7,000	7,000	14,000	8,000
	80/1	Z80	1,495	5,500	3/80				
	80/2	Z80	1,495	7,295	3/80				
Findex, Inc.	100	Z80	4,500	5,980	7/79	24	6	30	X
	128	Z80	8,230	8,980	/80	0	1	1	5
	234	Z80	6,980	8,500	1/80	170	300	470	1,505
	Total					194	307	501	1,510
General Robotics*	Polaris	LSI-11	13,000	13,000	4/78	0	100	100	X
Gnat Computers, Inc.	System 10	Z80-A, 8085	5,950	6,100	12/79	80	20	100	700
	System 10M	Z80-A, 8085	6,950	7,000	10/80	40	10	50	
	System 10H	Z80-A, 8085	NA	NA	7/81	0	0	0	
	Total					120	30	150	700
Heath	WH 89	Z80	2,295	2,500	8/79	270	30	300	NA
Hewlett-Packard	9830	HP	4,900	16,500	11/72	5,000	5,000	10,000	X
	9825	HP	5,900	10,900	1/76	9,470	16,830	26,300	8,450
	9835	HP	9,000	13,200	12/78	2,750	3,800	6,550	2,800
	9845	HP	12,000	28,800	11/77	8,200	11,900	20,100	8,800
	85	HP	3,250	3,550	1/80	5,150	5,150	10,300	31,250
	83	HP	2,250	2,550	1/81	0	0	0	NA
	Total					30,570	42,680	73,250	
IMSAI*	VDP-40	8085	5,300	5,300	/78	380	20	400	X
	VDP-80	8085	7,800	7,800	/77	670	130	800	X
	Total					1,050	150	1,200	
Industrial Microsystems	5000	8080, Z80	3,695	3,695	6/79	500	400	900	900
	8000	8080, Z80	5,295	5,295	6/79	900	900	1,800	1,400
	Total					1,400	1,300	2,700	2,300
Intelligent Systems	8051	8080A	3,650	4,200	/76	5,318	2,275	7,593	900
	8063	8080A	6,200	9,500	11/79				
	8300	8080A	5,795	7,000	7/80				
	8900	8080A	4,465	6,000	7/80				
	3621	8080A	3,300	3,300	7/79	130	60	190	X
	Compucolor 2	8080A	1,600	1,800	9/78	3,375	2,875	6,250	450
	3650	8080A	2,945	3,500	10/80	75	25	100	NA
	Total					8,898	5,235	14,133	
Interactive Computer Systems	MCM 900	2901	9,200	20,000	2/79	150	400	550	100
	MCM 800	Bipolar	8,600	17,000	1/77	50	150	200	X
	MCM 700	8008	7,200	12,000	3/75	50	250	300	X
	Total					250	800	1,050	100
IBM	5100	IBM	6,300	13,000	11/75	4,300	1,000	5,300	X
	5110	IBM	9,900	17,000	2/78	13,500	2,600	16,100	NA
	5120	IBM	9,340	15,000	2/80	5,000	1,100	6,100	NA
	Total					22,800	4,700	27,500	
Intertec Data Systems	Super Brain	Z80-A	2,995	2,995	10/79	6,650	3,350	10,000	18,000
	Super Brain QD	Z80-A	3,995	3,995	4/80				
	Compustar	Z80-A	2,500	3,500	1/81	0	0	0	10,000
	Total					6,650	3,350	10,000	28,000
Konix International Corp.	System 80	Z80	3,700	4,000	6/78	53	14	67	X
	System 81	Z80	3,700	4,100	1/80	18	1	19	X
	Total					71	15	86	
Micro V Coporation	Microstar I	8085A	7,500	15,000	8/78	900	900	1,800	NA
	Microstar II	8086	12,000	25,000	9/80	100	100	200	NA
	Series 3000	8086	18,000	24,000	5/81	0	0	0	800
	Total					1,000	1,000	2,000	
Micromation	System 100	Z80	2,930	9,500	1/80	125	15	140	100
	System 200	Z80	12,000	14,000	1/80	30	0	30	125
	Total					155	15	170	225
Midwest Scientific	MSI-6800 AW	6800	5,000	6,000	5/79	500	650	1,150	1,200
Morrow Designs	Decision I	Z80	5,000	7,500	4/81	0	0	0	80
NCR	7500	NCR	7,500	9,500	/79	1,000	2,000	3,000	NA
NEC Information Systems (U.S. Only)	205	NEC	8,560	13,350	7/80	180	-	180	450
NNC Electronics	80	Z80	4,450	4,450	2/80	100	100	200	400
	80W	Z80	7,650	7,650	11/80	15	15	30	200
	Total					115	115	230	600
North Atlantic Industries	SBC-1 Shoebox	LSI-11/2	1,980	1,980	1/81	0	0	0	NA
North Star Computers	Horizon	Z80-A	2,695	3,350	12/77	16,400	3,600	20,000	1,200
Northwest Microcomputers*	IVMS 85/P	8085	7,200	7,200	1/78	25	3	28	X
Odell Industries*	System 85	8085A	10,450	15,550	6/78	30	0	30	X
Ohio Scientific	Challenger	6502/6800	1,260	4,500	/78	6,450	650	7,100	NA

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Olivetti	P-6060	Olivetti	13,000	13,000	/77	1,000	-	1,000	X
(U.S. Only)	P-6066	Olivetti	11,600	11,600	3/81	0	-	0	700
	Total					1,000	-	1,000	700
Panasonic Co.	JD 850	8085	10,500	11,500	6/80	12	-	12	NA
(U.S. Only)	JD 740	8085	7,000	9,500	/81	0	-	0	NA
	JD 800	8085	8,000	9,000	/81	0	-	0	NA
	Total					12	-	12	
Pertec Computer	PCC 2000	8085A	9,995	13,120	9/78	1,069	965	2,034	1,300
Corporation	MITS 300/25/55	8080	8,080	13,800	/77	1,100	175	1,275	X
	Total					2,169	1,140	3,309	1,300
Polymorphic Systems	8813	8080	4,700	5,870	9/77	2,500	400	2,900	NA
	Twin Systems	8080	6,000	7,500	7/80	40	10	50	NA
	Total					2,540	410	2,950	
Processor Industry*	Sol I,II,III,IV	8080A	3,000	6,000	/77	4,500	500	5,000	X
Psytek, Inc.	Psytek 770	Z80	4,750	7,200	7/79	30	5	35	45
Quay Corporation	Quay 900,900/33	Z80	5,995	5,995	9/79	]	]	]	NA
	Quay 500	Z80	2,995	2,995	3/80	450	20	470	NA
	Quay 520	Z80	3,495	3,495	3/80	]	]	]	NA
	Total								NA
R2E of America	80/30	Z80	5,000	7,000	7/79	5	-	5	NA
(U.S. Only)	80/40	Z80	7,000	8,000	7/76	20	-	20	NA
	80/21	Z80	4,000	4,000	9/79	0	-	0	NA
	X Product	Z80	5,500	5,500	1/79	50	-	50	NA
	80/50	Z80	12,000	15,000	7/75	5	-	5	X
	Total					80	-	80	
Retail Sciences	Clerk 300	Z80	12,000	12,000	8/79	85	50	135	NA
Scientific Data Systems, Inc.	SDS 420 Series	6502	8,400	8,400	3/79	185	15	200	100
S.D. Systems	SDS 100	Z80	6,995	6,995	4/78	200	65	265	NA
	SDS 200	Z80	8,905	8,995	5/77	250	75	325	NA
	SDS 700	Z80	19,500	19,500	9/80	35	15	50	NA
	SDS 605	Z80	12,500	12,500	2/81	0	0	0	NA
	SDS 610	Z80	14,000	14,000	2/81	0	0	0	NA
	Total					485	155	640	
Sharp Electronics Corporation (U.S. Only)	YX-3200	Z80	5,975	5,975	5/81	0	0	0	NA
Smoke Signal	Chieftan	6800	2,595	3,000	3/79	400	125	525	50
Broadcasting	Chieftan	6809	2,695	3,100	3/80	250	150	400	500
	Total					650	275	925	550
Solid State Technology	8185	8085A	6,000	10,000	12/79	1,250	1,100	2,350	3,000
Systel Computers,	Model 11	8085, Z80	8,950	8,950	1/81	0	0	0	700
Inc.	Model 15	8085, Z80	9,950	9,950	1/81	0	0	0	1,400
Tandy Radio Shack	TRS-80/1	Z80	499	1,000		220,500	24,500	245,000	NA
	TRS-80/11	Z80	3,450	6,500		18,500	1,500	20,000	NA
	TRS-80/111	Z80	700	2,000		2,900	100	3,000	NA
	TRS-80 Color	Z80	399	399		1,900	100	2,000	NA
	Total					243,800	26,200	270,000	
Tano Corporation	Outpost II	6800	4,995	5,575	8/78	890	110	1,000	700
	Outpost 7	6800	3,000	4,000	8/77	180	20	200	X
	Total					1,070	130	1,200	700
Tektronix	4051	6800	5,995	17,000	12/75	8,280	4,420	12,700	NA
	4052	Tek	10,950	16,500	7/79	1,820	980	2,800	NA
	4054	Tek	19,140	24,500	7/79	]	]	]	NA
	Total					10,100	5,400	15,500	
Texas Instruments	99/4	TI9900	650	1,000	11/79	13,900	100	14,000	NA
Vector Graphics	System B, MZ	Z80	4,313	5,400	1/79	5,700	1,900	7,600	NA
	Memorite	Z80	8,950	8,950	1/79	300	100	400	X
	VIP	Z80	3,695	3,695	8/80	255	80	335	NA
	2800	Z80	7,295	7,295	7/80	150	50	200	NA
	3030	Z80	11,945	11,945	1/80	50	0	50	NA
	3005	Z80	7,950	7,950	3/81	0	0	0	NA
	2600	Z80	5,695	5,695	3/81	0	0	0	NA
	Total					6,455	2,130	8,585	
Wang	PCS 1	Wang 2200	5,400	8,000	4/76	840	320	1,160	X
	PCS 2	Wang 2200	4,800	10,145	4/77	2,950	1,900	4,850	X
	PCS 3	Wang 2200	6,500	9,000	4/80	25	10	35	
	Total					3,815	2,230	6,045	
Wave Mate	Series 2000	6800	2,395	3,000	1/79	100	100	200	NA
Zeda Computers	Zeda 580	Z80	6,038	6,250	6/79	275	25	300	2,500
International	Zeda 520	Z80	3,995	3,995	2/81	0	0	0	300
	Total					275	25	300	2,800
Zenith	Z89	Z80	2,895	2,895	10/79	2,700	300	3,000	2,000
Zilog	MCZ1	Z80	8,000	9,500	/77	1,300	1,100	2,400	1,200
	MCZ2	Z80	11,500	11,500	6/80	150	50	200	1,000
	Total					1,450	1,150	2,600	2,200
Total Of Above						680,962	273,652	954,614	
Total Other Vendors						2,000	0	2,000	
TOTAL						682,962	273,652	956,614	

Notes

*) Not currently active in manufacturing or marketing desktop computers.
NA) Data is not available.
X) Model not in new production.

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REVIEW & FORECAST
Part II

"The Gray Sheet"

EDP industry report

● THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

MOLLY UPTON, EDITOR JUNE 26, 1981 ● VOL.17,NO.3,4 P.J.McGOVERN,PUBLISHER

1981 ANOTHER BANNER YEAR FOR UNIT SHIPMENTS; DOLLAR VALUES WILL CLIMB 17.6% TO $31.5 BILLION

True to form, the recession appears to have had little impact on the overall healthy growth of the computer industry in 1980 and International Data Corp., publisher of EDP/IR, intrepidly predicts another banner year in 1981.

Last year, U.S.-based manufacturers racked up a 45% growth in worldwide unit shipments to 689,445 compared with 1979 while sustaining a 16% increase in the value of shipments. Much of the action came at the low end of certain segments, most notably smaller general purpose systems and microminis.

For 1981, the number of systems shipped should exceed 900,000, growing 32.4%, while the value of shipments will climb 17.6% to $31.5 billion. And although there will be minor soft spots along the way, the overall picture shows shipment values doubling between 1980 and 1985, from just under $27 billion to $56.6 billion. Propelling this phenomenon is a combination of several factors such as: the quest for productivity; the lure of price elasticity; and the fact that use is moving into everyman's grasp.

IBM PROCESSING POWER INSTALLED -- U.S.
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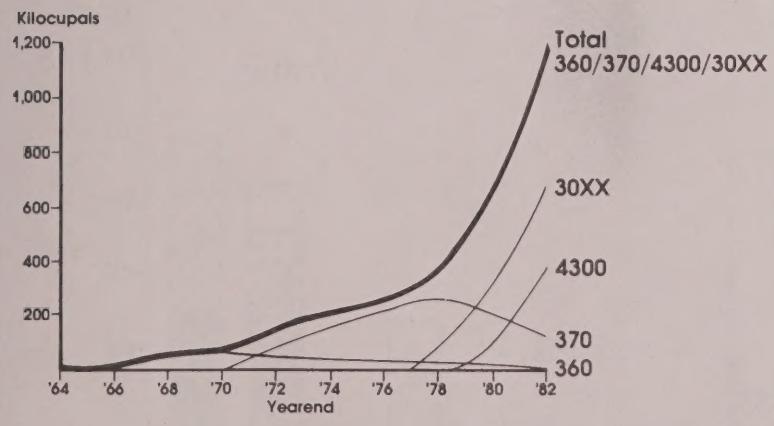

Thanks to technology as well as demand, in the next two years alone installed power will grow almost as much as it did in the past 16 years.

This chart depicts IBM's installed base, which at 60+% of the market, is a good indicator. IDC coined the term cupal to represent a power rating of one, which is equivalent to the power of a 360/20. The number of cupals installed is derived by multiplying the cupal ratings of particular models by the number installed.

EDP Industry Report is published in annual volumes of twenty-four issues each by International Data Corporation, Post Office Box 955, Five Speen Street, Framingham, MA 01701. Entire contents ©1981 by International Data Corporation. **Editor,** Molly Upton; **Census Editors,** Paul Arabasz, Lloyd Cohen; **Contributing Editors,** John Gantz, Jack Hart, David Moschella, James Peacock, Aaron Goldberg, David Terrie; **Circulation Manager,** Mary M. Trayte. Patrick J. McGovern, Chairman, International Data Group. John P. Breyer, President, International Data Corporation. Editorial ideas and information are researched and formulated by the editorial staff. Information and opinions in each issue are based on the best information available, but their accuracy and completeness cannot be guaranteed. **Subscriptions:** One year, $245; three years $590. Single copies priced as indicated on inside pages. Prices for multiple copies on request. Reproduction without written permission is completely forbidden. Telex 95-1168; Telephone **617/872-8200.**

VALUE OF WORLDWIDE SHIPMENTS OF
U.S. MANUFACTURERS 1980-1985
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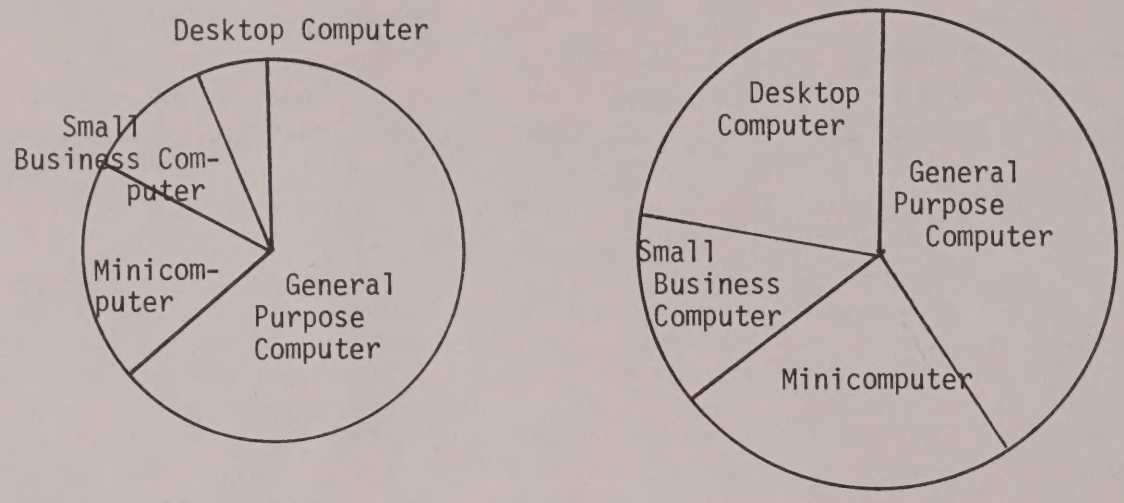

International Data Corp. sees the compound growth rate for worldwide shipments of U.S.-based makers rolling along at 28% for the 1980-1985 period, while the value of shipments should grow at nearly 17% compounded. Because of differences in growth rates, the revenue pie will be sliced quite differently in 1985 from 1980 as the desktop commandoes garner a larger slice at the expense of general purpose.

INSTALLED BASE BY SIZE CLASS
UNITED STATES
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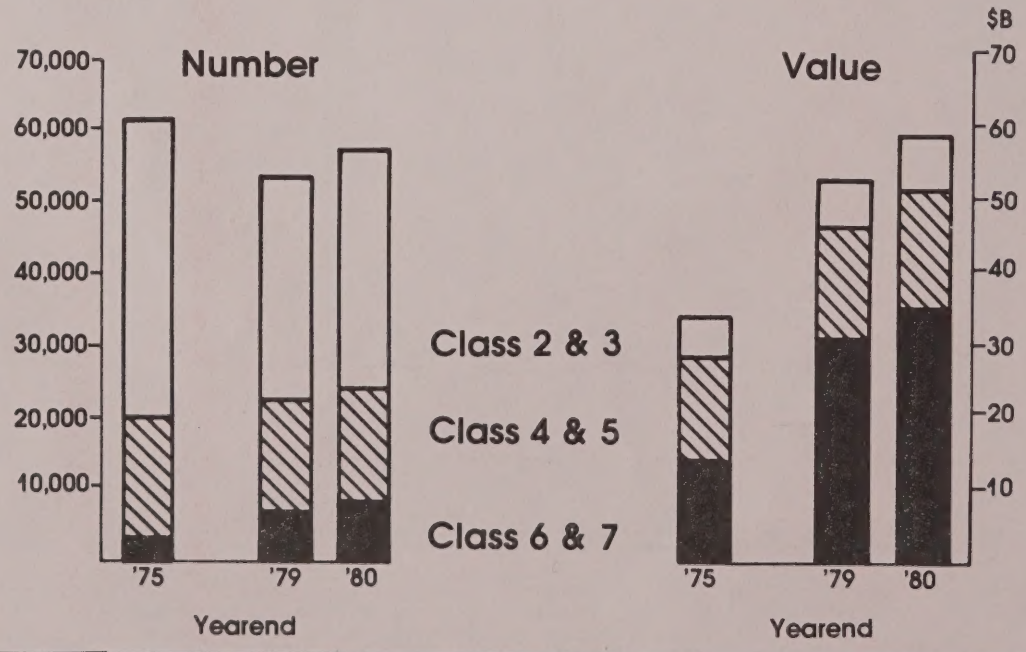

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Desktops will post the highest five-year compound growth rate in value of shipments, 49.2%; minis and small business computers are neck and neck at 21.9% and 20.2%, with general purpose lumbering along at about 6.1%.

Last year was a solid one for the mainframe segment. During 1980, the number of general purpose units shipped was more than double, exceeding IDC's year-ago forecast, and revenue growth was also greater than predicted. Mini shipments, buoyed by supermini shipments and Digital Equipment's activity in the micromini arena, also exceeded expectations by growing nearly 22%, although revenue growth was close to target at almost 23%.

Mainframes robust

Thanks to IBM's shipments of its System/38 and 4331, size classes two and three collectively showed their first growth in the size of the installed U.S. base since 1975. On the international front, Honeywell Level 61s and 62s joined the IBM S/38 and 4331 in the small mainframe comeback. In the mid-range, shipments of the 4300s were greater than anticipated, reflecting the migration of 370 users.

By contrast, shipments of the high end 3033 were less than anticipated. There are several possible explanations, including high interest rates, anticipation of the 3081, and an extended delivery schedule. The latter factor was probably caused by converting production lines over to the 3081; shipments were less than in 1979 so the cause wasn't high volume shipments. But the delayed delivery schedule could have been engineered by IBM to induce users to wait until the 3081 was announced. However, on an overall dollar basis, the 3033 shortfall was offset by the combination of high 4300 shipments as well as S/38s and IBM's worldwide shipment value rose by a healthy 12%.

WORLDWIDE GENERAL-PURPOSE NEW-BUILD COMPUTER SHIPMENTS
FOR U.S.-BASED MANUFACTURERS
(Copyright 1981 - International Data Corporation)

	1980			1979			1978	
	$M	% Total	%Δ	$M	% Total	%Δ	$M	% Total
IBM	10,650	62.4	11.5	9,550	62.5	(3)	9,845	67.5
Amdahl	380	2.2	4.1	365	2.4	15.8	315	2.1
NAS	190	1.1	5.6	180	1.1	--	--	--
Itel	--	--	--	--	--	--	350	2.4
Magnuson	35	.2	133.0	15	--	--	--	--
IPL	10	.1	--	--	--	--	--	--
PCM Peripherals	700	4.1	9.4	640	4.1	(8.6)	700	4.8
Subtotal PCM	1,315	7.7	9.6	1,200	7.5	87.9	1,365	9.4
TOTAL IBM BASE	11,965	70.1	11.3	10,750	70.1	95.9	11,210	76.8
HIS (+Xerox)	1,550	9.1	0	1,550	10.2	76.1	880	6.1
Sperry Univac	1,410	8.3	8.5	1,300	8.5	38.3	940	6.4
Burroughs	1,000	5.9	17.6	850	5.6	13.3	750	5.1
NCR	480	2.8	23.1	390	2.6	21.8	320	2.2
CDC	400	2.3	66.6	240	1.6	(20.0)	300	2.1
DEC	205	1.2	36.6	150	1.1	0	150	1.0
Cray	50	.3	--	--	--	--	--	--
Others	--	--	--	45	.3	12.5	40	.3
Non-IBM Base	5,095	29.9	12.6	4,525	29.9	33.9	3,380	23.2
TOTAL	17,060	100.0	11.7	15,275	100.0	4.7	14,590	100.0

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INFORMATION PROCESSING REVENUES -- LEADING MANUFACTURERS
(Millions of Dollars)
(Copyright 1981 -- International Data Corporation)

	1975	1976	1977	1978	1979	1980
IBM	11,850	13,400	14,765	17,074	18,338	21,367
NCR	1,415	1,674	1,944	2,240	2,634	2,951
CDC	1,246	1,358	1,513	1,868	2,273	2,791
Univac (3/31)	1,433	1,467	1,726	2,050	2,319	2,707
Burroughs	1,457	1,612	1,794	2,083	2,376	2,413
DEC (6/30)	534	736	1,059	1,437	1,804	2,368
HIS	856	914	1,037	1,294	1,453	1,634
HP (10/31)	399	461	588	769	1,092	1,546
TOTAL	19,190	21,622	24,426	28,815	32,289	37,770
IBM %	61.7	61.9	60.4	59.3	56.8	56.6

As can be seen by the above table, the mainframe species seems to have sustained its life rather well. Most of the above vendors derive a big part of their revenues from the mainframe market and all have grown at better than 10% over the past five years -- most of them much better than 10%. Some of Burroughs' softness in 1980 was attributable to non-mainframe areas.

Some notable trends perpetrated by mainframers as well as others in the industry are:

- Tendency toward purchase.
- Faster introduction of new technologies.
- Unbundling of software revenues.

Minicomputer makers are increasingly mounting attacks on the general purpose domain, primarily with superminis, whose shipments grew a hefty 42% in 1980 to 25,700 units. Indeed, the 1980-1985 supermini's compound growth rate should be 20.8% for unit shipments and 26.3% for the value of shipments. A couple of reasons for the high growth in this sector during 1980 are the availability of systems oriented toward commercial use -- the VAX and DG's MV/8000 got Cobol -- and growth in the distributed processing segment of the market. In addition, there seemed to be some pent-up demand among users who needed interactive machines.

The traditional mini market was a different story. Shipments in 1980 were less than in 1979, down 5.9% to 63,300. This segment of the industry should remain nearly flat through 1985, undoubtedly in part a victim of the micromini and the small business computer.

The micromini, fueled by DEC's efforts in the LSI family, soared beyond IDC's projections, reaching a 59% growth in shipments during 1980. The total

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1980 WORLDWIDE VALUE OF MINICOMPUTER SHIPMENTS
OF U.S. MANUFACTURERS
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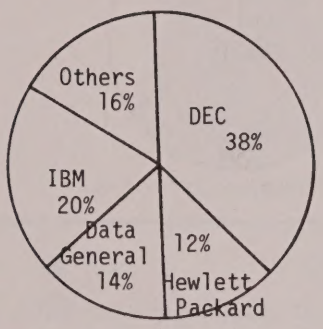
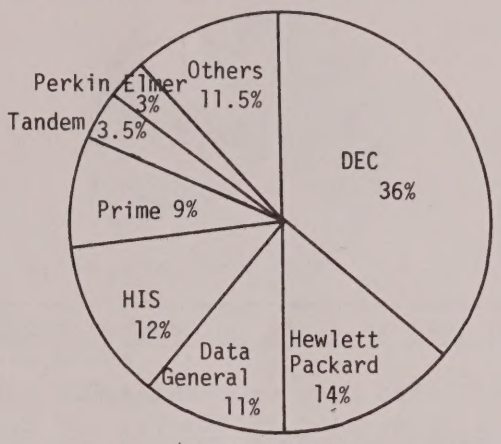


$1,409.3 Million
Traditional Minis



$2,968.7 Million
Superminis

industry shipments were 61,139 units, of which DEC accounted for 51,000. Most of these wended their way overseas last year as OEM channels closed up in the U.S. IDC anticipates micromini business will return to the U.S. next year as the recession fades.

One hint at the changes in the revenue bases may be glimpsed by examining the minicomputer vendors. IDC estimates that in 1980, they received over 16% of their revenues from service and about 5% from software. By 1985, this picture will have changed to reflect 21% from service and 10% from software.

1980 WORLDWIDE MINICOMPUTER MARKET ACTIVITY
(Copyright 1981 - International Data Corporation)

	$M Revenues			Units Shipped		
	1979 Revenue ($M)	1980 Revenue ($M)	% Share	1979 Units Shipped	1980 Units Shipped	% Share
Digital Equipment	1,850	2,447	38	55,000	73,800	4
Hewlett-Packard	750	1,010	16	9,300	9,295	6
Data General	540	672	11	15,750	19,850	13
HIS	290	425	7	3,125	4,900	3
IBM	240	350	6	7,000	8,600	6
Prime	153	268	4	1,028	2,000	1
Texas Instruments	200	243	4	7,380	8,450	6
Perkin Elmer	134	186	3	1,768	2,021	1
General Automation	125	155	2	4,319	4,573	3
Tandem	66	129	2	465	748	1
SEL	71	89	1	450	410	*
Sperry Univac	68	84	1	1,224	1,117	1
ModComp	72	81	1	501	410	*
Computer Automation	68	81	1	6,547	6,464	5
Harris	53	76	1	244	500	*
Others	300	134	2	7,899	7,684	5
TOTAL	4,980	6,430	100%	122,000	150,822	100%

*Less Than .05%

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U.S. DDP PRODUCT MIX -- DOLLARS SHIPPED
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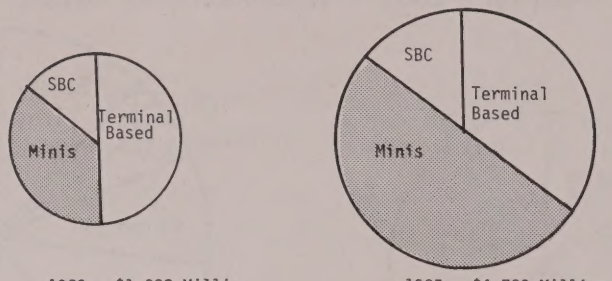

1980 - $1,232 Million

1985 - $4,789 Million

Minis to lead in distributed processing

Distributed data processing (DDP) is one of the markets into which minis, clustered processing terminals, and even small business computers and desktops are flowing. This arena should show a 30% compound growth in the value of shipments between 1980 and 1985 -- from $1,232 million to $4,788 million. The value of the installed base will grow even faster, 40% compounded, prompted by increased availability of communications capabilities that will enable users to utilize installed products in DDP applications.

Distributed data processing has emerged from a buzzword to a reality, but there are still numerous definitions. IDC cites five characteristics of a DDP system: local decentralized processing power for the end user; networking capability; common applications run at several sites; use of small processors for local processing; and report generating ability from locally stored and retrievable data.

Minis will play a growing role in DDP. Nearly 10% of all mini shipments during 1980 were to DDP environments and by 1985 this figure should be 19%, according to IDC. By 1985, shipments of minis to DDP will have outnumbered shipments of clustered processing terminals, once considered the major vehicle for DDP. Clustered processing terminals include IBM's 8100 and product lines of Datapoint and Four-Phase. The major portion of clustered processing terminal shipments will continue to be to the DDP market, from 78% of all shipments in 1980 to 90% in 1981.

DDP PRODUCT SHIPMENTS, U.S. MARKET, 1980 - 1985
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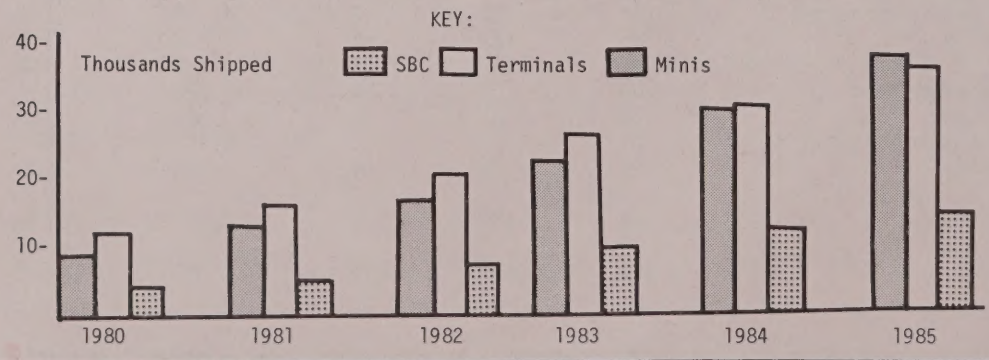

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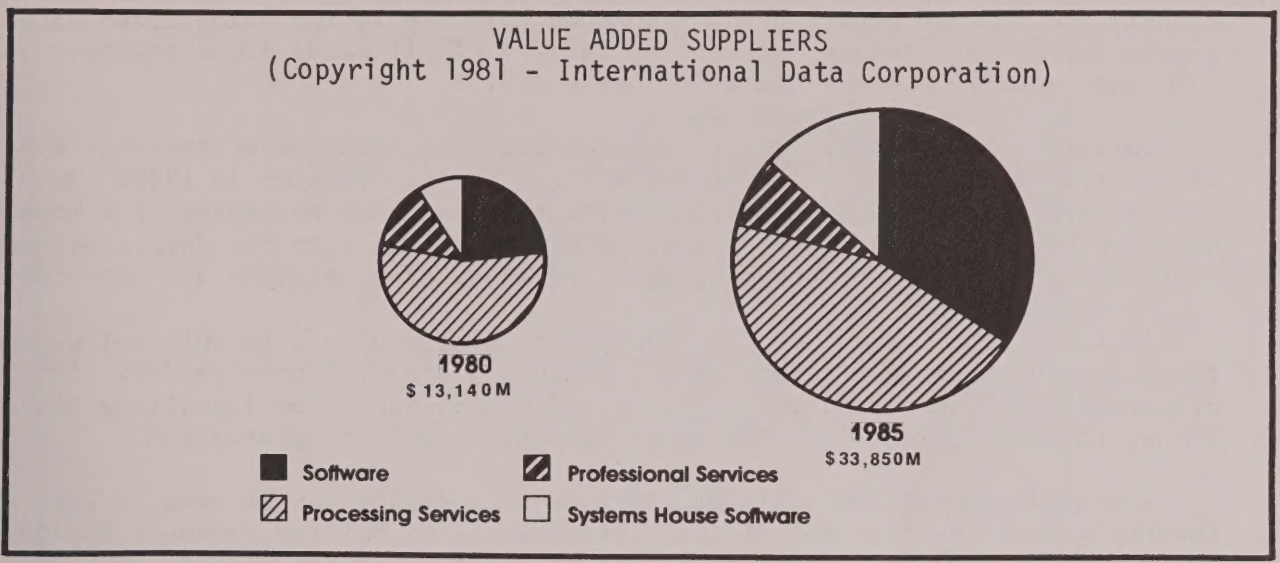

Software leads value added growth

Software is still the star among the value added supplier sectors of the market, which include software from hardware makers, systems houses' and independent packages, as well as processing and professional services. Overall, the worldwide revenues of U.S. value added suppliers should grow at a 21% compound rate, from $13.1 billion in 1980 to almost $33.9 billion in 1985.

Among the trends driving the value added supplier market are:

- User friendliness -- both in software per se and services;
- Acquisitions of services companies, often entailing
- Outside influence and impetus;
- Niche hunting.

The torrid pace of acquisitions both within and without the industry continues as medium to large size companies expand their grasp by buying up smaller, often batch shops, while at the same time often finding themselves acquisition targets from outside firms.

One of the common threads that seems to run through many of the outsider acquisitions is that the buyers are basically in the communications business. For instance, there is no dearth of publishers seeking to get their feet wet in on-line publishing by acquiring expertise and facilities from services firms. Readers Digest bought The Source, for instance.

Software, packages are hot

A 30% compound growth rate is forecast for revenues of the software sectors. These revenues will jump from a healthy $4.2 billion in 1980 to a whopping $15.5 billion in 1985.

The software sectors' piece of the value added suppliers' pie will grow from 32% to 46%. EDP/IR suspects this actual percentage is low as it doesn't reflect the revenues accrued from software by the processing providers.

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Revenues of packaged software from hardware manufacturers and independents should grow almost 34% compounded from 1980 to 1985 to $9.8 billion, making it clearly the hottest growth area. Packaged software is the value added market growth leader in revenues, accounting for 27% of all value added revenues in 1980 and growing to a 42% share in five years.

Hardware makers should see their revenues from packaged software grow at 39% compounded annually -- up nearly sixfold to $5.7 billion in 1985. Much of this growth reflects the unbundling trend that has been happening at a breakneck pace over the past three years and should continue in the future as vendors seek a greater percentage of their revenues from software and services.

In fact, with the era of the "nameplate" system almost in full swing, the field upgrades just don't provide the long-term steady income needed. Increasingly, hardware vendors simply are adding microcode or installing boards rather than replacing an entire CPU; thus the "nameplate generation."

The importance of the role of software to a vendor can be seen in the turnkey market; nearly half of its approximately $1 billion revenues in 1980 was generated from software and software support. Turnkey vendors supply hardware and software as solutions to particular tasks or industries. As such, the turnkey vendors are functioning as a distribution channel for packaged software. Thus, hardware is becoming a delivery mechanism for software.

Within the independent packaged software submarket, applications and utilities offerings are the fast runners, tied for a 29% compound rate, with applications maintaining its head start for a larger piece of the pie. Utilities will assume a larger role in user friendly systems as data management tools designed for the DP-inexperienced become more widely available both as software packages and as services offerings. Hence they might be considered the lynchpin behind the mood to increase use of computers.

Ease of use key to services, too

The processing services figures show that batch will not fade away anytime soon, although its growth is down to a pokey 6% compounded. Batch will be surpassed by remote problem solving revenues in 1982.

IDC has raised its growth estimates of remote problem solving services, which, along with remote transaction processing, should grow 21% over the five years. In this latter sector the supplier provides canned application software solutions for which users pay according to transaction volume and data base inquiry application solutions.

Remote problem solving, by contrast, involves the use of software tools. Remote problem solving should increase from almost 31% of the processing services pie to 37% in 1985. Remote problem solving services include plain vanilla time-sharing as well as application software tools -- such as query languages, data base management systems, financial planning, and decision support systems -- that permit the manipulation of data, some of which is usually user-generated.

Remote problem solving services are becoming increasingly business oriented and user friendly (their previous target was technical experts) by giving end users tools such as modeling, simulation, and data base management.

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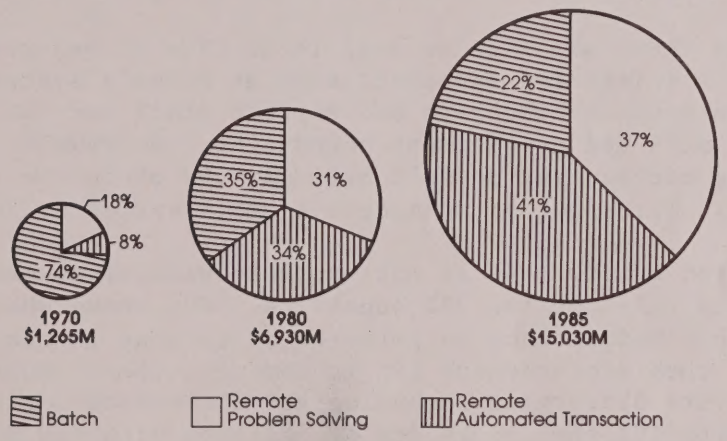
PROCESSING SERVICES BY ACCESS METHOD AND APPLICATION FUNCTION
(Copyright 1981 -- International Data Corporation)

	Batch	Remote Batch	Interactive
Transaction Processing (Solutions)	Payroll Processing Accounts Receivable	Material Requirements Planning Claims Processing	Invoicing Electronic Funds Transfer
Data Base Inquiry (Retrieval)	Business Credit Checking	Multiple Listing Services Library Cataloging Services	Stock Quotations Credit Card Authorization
Problem Solving (Tools)	Raw Computer Time Scientific/ Engineering Applications	Raw Computer Time Scientific/ Engineering Applications	Raw Computer Time Financial Modeling

Batch Remote Problem Solving Remote Automated Transaction

CHANGING SEGMENTATION OF THE PROCESSING SERVICES MARKETPLACE 1970-1985
(Copyright 1981 -- International Data Corporation)



Fight commences for office

One of the more interesting skirmishes involving industry participants is occurring in what was once considered an outpost: the office. With the realization that the world does not begin and end with functions provided by the "data processing" establishment, computer companies weekly are leaping on the "information processing" bandwagon. Part of the price of entry is endowing users with text processing capabilities with an ease of use that formerly was the preserve of companies that offered dedicated word processors.

The office game can be played at several different levels, and some vendors are preparing their positions on multiple fronts. The overriding question is what variety of capabilities do users want integrated into an easy to use system. How to integrate these capabilities is the challenge -- and IBM is in the same quandary as all the rest of the folks.

At the standalone level, the trend is definitely toward hybrid systems, or those that offer both word processing and data processing capabilities.

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Hybrid capabilities are now common and can be found on any system that runs CP/M, thanks to some relatively primitive WP packages that run under that operation system. Participants in this game range from desktoppers such as Northstar to heavies such as Xerox with its 820 "Worm" desktop and Wang, whose Wangwriter will acquire CP/M capability. And there are others such as Datapoint and Four-Phase that added WP to their systems. And when is IBM going to tap the power of the 8086 imbedded in its Displaywriter?

Text processing software is getting fairly sophisticated -- there are spelling packages ranging from detecting to correcting odd spellings and dictionaries that can be amended by the user.

A minimal requirement is that data and text files be compatible and transferrable from one sector of the system to the other. While this sounds obvious, it represents a significant challenge to some vendors that have gone outside to purchase WP software and slapped it on as an adjunct.

Then there are the shared resource folks. These systems can be either strictly WP or hybrid and generally share at least printers and disks; some, like Wang, have scattered many of the electronics pertaining to screen response time out into the workstations (formerly known as terminals).

And for those who want to sell their CPUs of supermini size or bigger, there is the integrated approach, such as Prime's system that provides different workstations for managers and support staff and includes such functions as electronic mail and appointment scheduling. Honeywell is attempting to make a bid in this market, but doesn't have all the executive functions such as scheduling. It, too, has announced a small system called (Info)writer.

An office environment is not complete without communications, and it is too early to rule out the PBX suppliers. Who knows what lurks in the heart of AT&T's Archie McGill once he gets the OK to play in nonregulated arenas? First PBX, then picturephone (it is coming), then? Rolm has an OEM agreement to manufacture Convergent Technologies' 8086-based workstations. Datapoint announced its ISX that links its Arc systems with its own PBX. And for those who like cable of whatever ilk, witness the local network battle between Ethernet advocates and others. Wang just introduced a broadband cable system and other vendors are hinting they too will offer local net capability.

• Inflation -- The value of computer system shipments shown in the Review and Forecast pages (Red) represents the price of equipment at the time of sale, i.e., the shipment values are in "current" dollars. Any inflation is included in the values shown. Computer system prices have, in fact, decreased over time for a given amount of computing power, and can thus be considered to have been deflationary rather than inflationary. But inflation has taken its toll by lessening the amount of price decreases. IDC expects the effects of inflation as measured by the GNP implicit price deflator to be about the same over the next five years as in the past five years, about 7% a year.

• Note -- The "Number in Use" column accounts -- in aggregate -- for retirements. In the minicomputer summary, this column also includes "transshipments," i.e., those computers which are originally shipped to a U.S. location but eventually are installed outside the U.S. The "Value in Use" column represents the if-sold value at the time of shipment.

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COMPUTER MARKET SUMMARY
(U.S.-Based Manufacturers)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1975	75,600	329,440	$ 12,255	$ 67.1
1976	101,140	407,630	13,332	76.7
1977	161,970	545,060	16,133	89.3
1978	312,120	837,640	19,808	104.8
1979	473,580	1,278,220	23,013	120.9
1980	689,445	1,929,965	26,794	141.4
1981	913,045	2,798,210	31,515	165.1
1982	1,190,955	3,938,465	36,583	193.0
1983	1,525,125	5,405,190	42,258	225.3
1984	1,926,420	7,256,710	48,628	263.4
1985	2,386,395	9,568,805	56,640	309.1
		UNITED STATES		
1975	50,300	212,640	$ 6,678	$ 37.9
1976	65,340	261,680	7,098	43.4
1977	112,280	355,120	8,969	50.5
1978	225,530	563,550	10,865	58.9
1979	312,910	849,560	12,635	67.2
1980	462,490	1,283,750	15,177	78.7
1981	623,085	1,875,335	17,876	92.1
1982	815,075	2,655,410	21,043	108.4
1983	1,043,035	3,658,345	24,208	127.0
1984	1,308,430	4,916,775	28,023	149.3
1985	1,611,960	6,476,835	33,012	176.3
		INTERNATIONAL		
1975	25,300	116,800	$ 5,577	$ 29.2
1976	35,800	145,950	6,234	33.3
1977	49,690	189,940	7,164	38.8
1978	86,590	274,090	8,943	45.9
1979	160,670	428,660	10,378	53.7
1980	226,955	646,215	11,617	62.7
1981	289,960	922,875	13,639	73.0
1982	375,880	1,283,055	15,540	84.6
1983	482,090	1,746,845	18,050	98.3
1984	617,990	2,339,935	20,605	114.1
1985	774,435	3,091,970	23,628	132.8

This is the total of all general-purpose computers, minis, small business computers (SBCs), desktop computers, and "other" systems such as IBM's S/7. Minis used in SBCs are subtracted to eliminate double counting. Detailed tables follow (general-purpose, SBC, and desktop tables are mutually exclusive, but the minicomputer table includes computers subsequently shipped to users -- by the minimakers or by systems houses -- as SBCs).

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GENERAL PURPOSE COMPUTER MARKET
(U.S.-Based Manufacturers)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1975	13,500	114,100	$ 10,610	$ 61.2
1976	14,800	111,200	10,830	68.5
1977	17,800	111,500	12,500	77.7
1978	11,100	112,800	14,590	88.4
1979	10,600	107,500	15,270	97.4
1980	23,400	115,100	17,060	108.8
1981	26,500	124,800	18,400	120.2
1982	24,600	134,100	19,700	132.2
1983	21,800	142,500	20,700	144.3
1984	27,400	151,600	21,500	157.0
1985	26,200	160,500	22,900	170.5
		UNITED STATES		
1975	6,700	62,100	$ 5,610	$ 33.8
1976	7,200	59,600	5,530	37.9
1977	8,900	58,200	6,600	42.9
1978	4,500	57,900	7,500	48.3
1979	5,000	53,300	7,670	52.2
1980	11,800	56,500	9,170	58.2
1981	12,800	60,800	9,500	63.9
1982	11,600	64,800	10,300	70.1
1983	10,300	68,900	10,500	76.0
1984	13,200	73,400	10,900	82.3
1985	12,300	77,600	11,700	89.1
		INTERNATIONAL		
1975	6,800	52,000	$ 5,000	$ 27.4
1976	7,600	51,600	5,300	30.6
1977	8,900	53,300	5,900	34.8
1978	6,600	54,900	7,090	40.1
1979	5,600	54,200	7,600	45.2
1980	11,600	58,600	7,890	50.6
1981	13,700	64,000	8,900	56.3
1982	13,000	69,300	9,400	62.1
1983	11,500	73,600	10,200	68.3
1984	14,200	78,200	10,600	74.7
1985	13,900	82,900	11,200	81.4

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MINICOMPUTER MARKET
(U.S.-Based Manufacturers)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	$ Billion Value In Use
		WORLDWIDE		
1975	48,600	181,400	$ 1,155	$ 3.8
1976	58,600	235,500	1,550	5.2
1977	82,900	312,300	2,215	7.3
1978	101,500	405,600	2,985	10.0
1979	123,900	518,000	4,085	13.8
1980	150,800	651,700	5,015	18.4
1981	180,100	809,700	6,190	24.1
1982	215,300	997,300	7,710	31.2
1983	256,100	1,220,200	9,455	39.9
1984	300,800	1,482,000	11,345	50.4
1985	349,800	1,784,800	13,470	62.8
		UNITED STATES		
1975	34,500	126,300	$ 725	$ 2.6
1976	42,200	162,500	995	3.4
1977	60,600	215,300	1,445	4.7
1978	70,400	275,800	1,915	6.4
1979	82,100	345,200	2,665	8.7
1980	90,200	419,700	3,130	11.5
1981	108,100	508,800	3,840	15.0
1982	127,000	613,000	4,705	19.2
1983	151,100	737,100	5,770	24.4
1984	174,500	880,100	6,805	30.5
1985	202,900	1,045,600	8,080	37.8
		INTERNATIONAL		
1975	14,100	55,100	$ 430	$ 1.2
1976	16,400	73,000	555	1.8
1977	22,300	97,000	770	2.6
1978	31,100	129,800	1,070	3.6
1979	41,800	172,800	1,420	5.1
1980	60,600	232,000	1,885	6.9
1981	72,000	300,900	2,350	9.1
1982	88,300	384,300	3,005	12.0
1983	105,000	483,100	3,685	15.5
1984	126,300	601,900	4,540	19.9
1985	146,900	739,200	5,390	25.0

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General-Purpose Computer Census are based on the best information available to IDC but are estimates nevertheless. General Purpose computers -- as characterized by IBM's System/3, System/38, 370, 4300, 303X, and 3081, and competitors -- are designed for use in a wide variety of applications. They are character or byte oriented and programmed in higher level languages. Many of the General-Purpose computer manufacturers also market smaller systems, also general-purpose in design, which are included in the Small Business Computer and Minicomputer censuses.

Instead of being defined by shifting average purchase or rental values, size classes are based on IBM products and other manufacturers' models that compete with them, e.g., a computer in size class 7 would compete with an IBM 3033. Average purchase and monthly rental values are based on system price including peripherals except for plug compatible vendors Amdahl, Cambex, CDC-Omega, IPL, Magnuson, and NAS, where only CPU value is counted. An "X" in the last column means none will be shipped from the original manufacturer, and an "*" means none will be shipped until after 1981.

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL ($000)	AVERAGE PURCHASE PRICE ($000)	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	ORDERS FOR 1981 INSTALLATION
Amdahl	470V/5, II	6	69.0	2,205	9/77	41	33	74	X
	470V/6, II	7	91.0	3,260	6/75	130	52	182	X
	470V/7C	6	69.0	1,100	3Q/81	-	-	-	50
	470V/7, A, B	7	98.0	2,530	9/78	90	70	160	75
	470V/8	7	112.0	2,900	9/79	48	32	80	55
	580/5860	7	130.0	4,100	4/82	-	-	-	*
	580/5880	7	235.0	7,500	2Q/83	-	-	-	*
	Total					309	187	496	180
Burroughs	2/3/500	3	6.6	315	11/61	180	160	340	X
	1710	2	2.8	132	8/72	525	510	1,035	X
	1720	3	7.3	350	2/73	370	270	640	X
	1815/25/30	2	3.0	118	5/77	260	510	770	1,400
	1855/60/70/85	3	6.1	245	5/77	1,180	460	1,640	
	1905	2	3.2	95	4/80	10	10	20	
	1955/85	3	6.2	185	4/80	375	150	525	
	2500	4	10.4	499	2/67	17	30	47	X
	2700	4	11.0	530	8/72	195	125	320	X
	2800	4	10.4	415	12/76	255	145	400	X
	2900	4	12.9	450	7/80	70	85	155	275
	3500	4	19.0	911	5/67	175	185	360	X
	3700	4	26.0	1,230	11/72	235	245	480	X
	3800	4	15.8	630	4/77	250	75	325	95
	3900	4	18.6	650	/81	-	-	-	
	45/4700	5	33.0	1,560	10/71	260	115	375	X
	4800	5	32.0	1,290	9/76	230	90	320	25
	55/5700	5	35.0	1,680	3/63	18	11	29	X
	5900	5	26.0	800	2Q/81	-	-	-	90
	65/6700	6	66.0	3,170	11/69	125	110	235	X
	6800	5	43.0	1,630	6/77	280	120	400	170
	6900	5	66.0	2,100	11/80	34	5	39	
	7700	7	134.0	6,440	8/73	48	27	75	X
	7800	7	126.0	4,800	11/78	38	20	58	35
	Total					5,130	3,458	8,588	2,090
Cambex	1636	4	4.3	130	/81	-	-	-	5
	1638/40	4	3.8	115	1/79	12	7	19	X
	1641	4	6.8	205	10/80	-	3	3	20
	1651	5	9.5	285	3Q/81	-	-	-	2
	Total					12	10	22	27
CDC	Omega 480-1	4	12.5	375	6/77	67	2	69	5
	Omega 480-2	5	13.0	390	8/78	51	2	53	5
	Omega 480-3	5	17.5	420	1/80	22	1	23	30
	Subtotal					140	5	145	40
	Cyber 170-720	5	35.0	1,400	5/79	52	55	107	65
	Cyber 170-730	6	50.0	2,000	6/79	28	10	38	25
	Cyber 170-740	6	73.0	2,900	4/80	2	-	2	5
	Cyber 170-750	6	108.0	4,300	8/79	11	10	21	13
	Cyber 170-760	7	138.0	5,500	4/79	9	2	11	10
	Cyber 71	4	21.0	915	7/76	4	9	13	X
	Cyber 171	4	28.0	1,080	8/77	21	50	71	X
	Cyber 72	5	42.0	1,810	10/71	13	35	48	X
	Cyber 172	6	51.0	1,930	7/75	26	47	73	X
	Cyber 73	6	61.0	2,630	3/72	20	35	55	X
	Cyber 173	6	83.0	3,150	9/75	11	29	40	X
	Cyber 74	7	116.0	5,000	3/72	22	15	37	X
	Cyber 174	6	105.0	3,980	9/75	14	20	34	X
	Cyber 175	7	150.0	5,700	8/75	25	37	62	X
	Cyber 76	7	184.0	7,905	3/72	7	8	15	X
	Cyber 176	7	180.0	7,200	1/78	10	2	12	2
	Cyber 203	7	238.0	9,500	11/80	2	-	2	X
	Cyber 205	7	263.0	10,500	1Q/81	-	-	-	5
	Subtotal					277	364	641	125
	G-20	4	19.3	830	4/61	1	-	1	X
	1604	6	41.0	1,750	1/60	5	-	5	X
	31/3150	4	9.7	419	12/64	39	18	57	X
	3170	5	23.0	970	12/70	14	13	27	X
	3200	4	14.5	625	5/64	20	16	36	X
	3300	5	35.0	1,491	9/65	74	39	113	X
	3400	5	24.0	1,019	11/64	3	-	3	X
	3500	5	31.0	1,341	1/69	29	10	39	X
	3600	6	49.0	2,107	6/63	9	8	17	X
	3800	6	60.0	2,568	12/65	12	1	13	X
	6200	6	42.0	1,825	11/70	-	1	1	X
	6400	6	63.0	2,723	5/66	35	19	54	X
	6500	6	86.0	3,700	12/67	15	12	27	X
	6600	7	116.0	4,990	8/64	38	21	59	X
	6700	7	140.0	6,005	7/70	3	-	3	X
	7600	7	191.0	8,200	1/69	20	7	27	X
	Star 100	7	279.0	12,010	12/74	3	-	3	X
	Subtotal					320	165	485	
	Total					737	534	1,271	165
Cray	1A	7	213.0	8,530	4/76	10	6	16	10
	1S	7	177.0	7,070	11/80	3	-	3	
	Total					13	6	19	10
DEC	2020	3	7.3	290	7/78	175	140	315	125
	2040/50	4	17.0	680	6/76	130	85	215	5
	2060	5	23.0	900	7/79	125	55	180	75
	PDP-6	4	10.0	400	10/64	2	1	3	X
	1040/50	4	17.3	693	10/67	125	80	205	X
	1060/70	5	22.0	860	6/72	120	100	220	X
	1080/90	6	33.0	1,300	6/75	175	105	280	25
	Total					852	566	1,418	230

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GENERAL-PURPOSE COMPUTER CENSUS - (Continued)

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL ($000)	AVERAGE PURCHASE PRICE ($000)	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	ORDERS FOR 1981 INSTALLATION
Honeywell	DPS 8/20	4	14.8	490	4/80	20	5	25	190
	DPS 8/44	4	24.0	780	1/80	25	5	30	100
	DPS 8/52	5	53.0	1,760	11/80	5	2	7	90
	DPS 8/62	5	67.0	2,200	30/81	-	-	-	50
	DPS 8/70	6	103.0	3,400	5/80	15	5	20	140
	Subtotal					65	17	82	570
	H-61/40	2	2.4	97	6/76	-	1,650	1,650	
	H-61/58	2	2.5	104	6/74	90	720	810	750
	H-61/60	2	3.7	150	6/74	45	2,100	2,145	
	H-Level 62, DPS 4	3	5.8	230	10/74	1,000	2,350	3,350	470
	H-64/300	4	9.7	360	4/79	95	375	470	230
	H-Level 64	4	12.8	525	10/74	260	1,025	1,285	X
	H-66/05/07	4	20.0	825	10/76	105	135	240	X
	H-66/10/17	5	32.0	1,320	6/75	65	105	170	X
	H-66/20/27	5	46.0	1,870	11/74	140	160	300	X
	H-66/40/60	6	87.0	3,570	10/74	190	160	350	10
	H-66/440/520	5	20.0	800	12/79	85	40	125	10
	H-66/DPS, BC	6	82.5	3,300	7/78	110	170	280	45
	H-66/80	7	135.0	5,550	10/74	28	55	83	10
	H-68/80	7	117.0	4,775	10/74	30	3	33	X
	H-68/DPS	7	130.0	5,200	9/78	15	9	24	15
	Comshare/Xerox	5	14.6	600	6/79	10	-	10	10
	Subtotal					2,268	9,057	11,325	1,580
	G-50	2	2.0	82	8/70	95	1,050	1,145	X
	G-100	3	5.1	215	4/66	70	840	910	X
	G-200	4	10.1	425	4/61	75	13	88	X
	G-400	4	16.7	700	5/64	140	110	250	X
	G-600	6	81.0	3,400	4/65	27	13	40	X
	G-6023/25	5	35.0	1,490	11/73	21	18	39	X
	G-6030/40	5	45.0	1,900	6/71	38	86	124	X
	G-6050/60	6	77.0	3,250	7/71	100	55	155	X
	G-6070/80	6	116.0	4,890	7/71	34	32	66	X
	G-6180	7	113.0	4,750	2/74	5	-	5	X
	Gamma-10	2	2.6	108	7/64	-	350	350	X
	Gamma-30	4	10.4	437	2/62	-	27	27	X
	Subtotal					605	2,594	3,199	
	H-105/115	3	6.8	280	3/70	100	125	225	X
	H-110/120/200	3	7.0	285	1/66	230	110	340	X
	H-125	4	8.9	365	12/67	10	60	70	X
	H-2020/30	3	4.6	190	1/73	300	80	380	X
	H-1015/2015	4	19.6	805	2/71	30	21	51	X
	H-1200	4	15.3	629	2/66	145	38	183	X
	H-2040	4	14.5	595	4/72	155	64	219	X
	H-2050/60	4	22.0	920	4/72	110	82	192	X
	H-2200	4	21.0	862	1/66	57	18	75	X
	H-2070	5	39.0	1,600	5/72	26	2	28	X
	H-3200	5	30.0	1,220	2/70	55	28	83	X
	H-4200	5	47.0	1,920	9/68	6	2	8	X
	H-8200	6	72.0	2,950	2/69	13	8	21	X
	H-4/1400	4	13.7	560	12/61	6	7	13	X
	H-8/1800	5	37.0	1,500	12/60	6	3	9	X
	Subtotal					1,249	648	1,897	
	Total					4,187	12,316	16,503	2,120
IBM	System/38-3	2	3.9	125	7/80	600	840	1,440	2,450
	System/38-5	3	8.3	265	7/80	1,900	1,460	3,360	5,350
	Subtotal					2,500	2,300	4,800	7,800
	System/3-4	2	1.6	58	6/76	200	60	260	X
	System/3-6	2	2.1	75	12/70	470	370	840	X
	System/3-8	2	2.6	94	6/75	1,800	2,420	4,220	X
	System/3-10	2	3.2	115	1/70	4,450	3,100	7,550	X
	System/3-12	3	4.7	169	3/76	2,600	2,700	5,300	X
	System/3-15	3	8.6	310	3/74	3,380	2,050	5,430	X
	Subtotal					12,900	10,700	23,600	
	4331-1	3	11.6	370	4/79	3,600	2,300	5,900	2,900
	4331-2	4	17.0	545	8/80	300	300	600	3,050
	4341-1	4	26.0	835	10/79	1,650	2,050	3,700	2,300
	4341-2	5	37.0	1,185	20/81	-	-	-	1,350
	Subtotal					5,550	4,650	10,200	9,600
	3031	6	69.0	2,290	3/78	1,000	1,180	2,180	40
	3032	6	118.0	3,900	3/78	290	470	760	X
	3033S	6	96.0	2,200	1/81	-	-	-	500
	3033N	7	133.0	3,600	1/80	150	140	290	280
	3033U,A,M	7	208.0	6,850	3/78	825	550	1,375	290
	3081D	7	219.0	7,000	40/81	-	-	-	75
	Subtotal					2,265	2,340	4,605	1,185
	370/115	3	11.3	450	4/74	480	1,660	2,140	X
	370/125	4	15.5	620	6/73	550	1,330	1,880	X
	370/135	4	24.0	960	5/72	710	1,130	1,840	X
	370/138	4	25.0	890	11/76	1,670	2,350	4,020	X
	370/145	5	45.0	1,790	7/71	780	960	1,740	X
	370/148	5	44.0	1,540	3/77	1,370	1,470	2,840	X
	370/155	6	81.0	3,250	2/71	335	190	525	X
	370/158	6	126.0	5,025	5/73	1,500	1,250	2,750	X
	370/165	7	153.0	6,100	6/71	70	28	98	X
	370/168	7	226.0	9,050	7/73	610	305	915	X
	370/195	7	311.0	12,450	3/71	9	3	12	X
	Subtotal					8,084	10,676	18,760	
	360/20	3	2.9	136	12/65	550	700	1,250	X
	360/22	3	3.7	174	7/71	30	58	88	X
	360/25	3	8.3	391	10/68	35	215	250	X
	360/30	4	11.2	528	6/65	820	480	1,300	X
	360/44	4	18.7	880	7/66	39	23	62	X
	360/40	4	19.0	895	6/65	700	480	1,180	X
	360/50	5	33.0	1,550	8/65	325	190	515	X
	360/65	6	69.0	3,250	11/65	290	95	385	X
	360/67, 75, 85	7	128.0	6,020	1/66	29	14	43	X
	360/9X	7	195.0	9,150	11/67	6	4	10	X
	Subtotal					2,824	2,259	5,083	
	1130	2	2.5	120	2/66	900	760	1,660	X
	1401	3	3.7	178	9/60	360	250	610	X
	1401-G, H	2	2.2	106	5/64	9	3	12	X
	1410	4	16.7	800	11/61	11	8	19	X
	1440	3	4.7	227	4/63	29	48	77	X
	1460	4	9.6	460	10/63	6	4	10	X
	1620	3	2.7	129	9/60	48	48	96	X
	7010	5	25.0	1,200	10/63	4	3	7	X
	7040/44	5	30.0	1,439	6/63	4	5	9	X
	7070/74	5	27.0	1,299	3/60	43	3	46	X
	7080	6	58.0	2,800	8/61	14	-	14	X
	7090/94	6	70.0	3,350	8/60	12	6	18	X
	Subtotal					1,440	1,138	2,578	X
	Total					35,563	34,063	69,626	18,585

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GENERAL-PURPOSE COMPUTER CENSUS - (Continued)

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	SIZE CLASS	AVERAGE MONTHLY RENTAL ($000)	AVERAGE PURCHASE PRICE ($000)	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	ORDERS FOR 1981 INSTALLATION
IPL	4436	4	5.8	175	/81	-	-	-	70
	4443	4	7.5	225	3/80	10	40	50	-
	Total					10	40	50	70
Magnuson	M80/3	4	6.5	195	1/79	19	1	20	X
	M80/4	5	10.3	310	12/78	85	15	100	X
	M80/31	4	4.8	145	6/80	28	2	30	50
	M80/32	4	7.3	220	6/80	48	2	50	90
	M80/42	4	10.8	325	/81	-	-	-	25
	M80/43	5	12.3	370	20/81	-	-	-	20
	M80/44	5	12.7	380	30/81	-	-	-	10
	Total					180	20	200	195
National Advanced Systems	AS/3000	4	14.0	420	1/80	22	5	27	40
	AS/5000	5	19.2	575	2/80	30	10	40	75
	AS/7000	6	52.0	1,550	4/80	15	13	28	55
	AS/9000	7	137.0	4,100	11/80	1	1	2	15
	AS/3	4	17.7	585	11/78	35	35	70	X
	AS/4	5	27.0	885	6/77	33	16	49	X
	AS/5	6	43.0	1,420	3/77	130	95	225	X
	AS/7020/30	5	23.0	750	1/79	-	11	11	X
	AS/7031	6	38.0	1,250	12/78	45	35	80	X
	AS/6	6	68.0	2,250	5/78	50	40	90	X
	Total					361	261	622	185
NCR	8270	2	2.1	80	11/79	235	350	585	450
	8350	2	3.8	144	7/77	135	15	150	X
	8370	3	6.8	260	7/78	10	-	10	X
	8410	2	3.8	143	1/79	430	75	505	330
	8430	3	6.2	235	6/78	78	135	213	70
	8450	3	8.8	335	11/77	285	170	455	X
	8455	3	8.2	245	4/79	270	80	350	190
	8550	3	14.7	560	4/76	260	225	485	X
	8555	3	13.0	390	7/79	270	140	410	280
	8560	4	17.9	680	11/77	68	34	102	X
	8565	4	17.0	510	4/79	85	75	160	120
	8570	4	22.0	830	5/76	100	115	215	X
	8575	4	22.0	650	4/79	50	40	90	70
	8580	5	41.0	1,550	12/78	9	11	20	X
	8585	5	43.0	1,300	8/79	20	30	50	35
	8650	6	67.0	2,350	/81	-	-	-	5
	8670	7	100.0	3,500	/81	-	-	-	5
	Subtotal					2,305	1,495	3,800	1,555
	Century 50	2	1.7	80	2/71	210	27	237	X
	Century 75	2	2.4	112	7/76	60	-	60	X
	Century 100	3	3.4	157	9/68	195	425	620	X
	Century 101	3	4.4	201	10/72	530	510	1,040	X
	Century 151	3	6.0	275	2/75	195	115	310	X
	Century 200	4	8.0	367	9/69	115	235	350	X
	Century 201	4	12.8	590	8/74	155	95	250	X
	Century 251	4	22.0	1,005	11/73	33	46	79	X
	Century 300	5	29.0	1,340	2/72	72	72	144	X
	315	3	3.6	164	5/62	20	65	85	X
	315-RMC	4	10.9	500	9/65	3	11	14	X
	Subtotal					1,588	1,601	3,189	
	Total					3,893	3,096	6,989	1,555
Singer	System 10	2	2.7	120	10/70	1,200	-	1,200	X
Sperry Univac	111	4	27.0	1,124	8/62	65	18	83	X
	SS80/90	3	8.5	355	8/58	-	2	2	X
	4181, II	4	10.7	450	6/63	41	47	88	X
	418 III	4	40.0	1,700	6/69	44	80	124	X
	491/492	5	27.0	1,150	12/61	7	8	15	X
	494	6	76.0	3,200	2/66	55	49	104	X
	1004	2	1.1	46	2/63	150	110	260	X
	1005	2	2.0	85	4/66	135	44	179	X
	1050	3	9.0	380	9/63	115	22	137	X
	Subtotal					612	380	992	
	9200	2	2.3	98	6/67	300	325	625	X
	9300	3	5.0	212	9/67	245	270	515	X
	9400/80	4	12.6	530	5/69	135	245	380	X
	90/25	3	4.6	180	8/77	100	100	200	X
	90/30	3	9.7	380	2/75	990	1,300	2,290	50
	90/40	4	17.3	675	6/78	130	155	285	45
	90/60	4	28.0	1,090	1/74	120	175	295	10
	90/70/9700	5	33.0	1,275	8/72	17	39	56	X
	90/80	5	74.0	2,900	12/76	105	50	155	50
	System/80-3	2	4.2	130	12/80	15	10	25	470
	System/80-5	3	9.7	300	20/81	-	-	-	280
	Subtotal					2,157	2,669	4,826	905
	1106	6	46.0	1,920	12/69	43	160	203	X
	1107	6	60.0	2,525	10/62	3	7	10	X
	1108	7	89.0	3,750	9/65	125	90	215	X
	1110	7	149.0	6,250	6/72	38	55	93	X
	1100/10	5	51.0	1,880	4/76	110	170	280	X
	1100/20	5	69.0	2,540	4/75	21	36	57	X
	1100/40	6	116.0	4,300	7/75	34	38	72	X
	1100/60	5	49.0	1,700	1/80	75	105	180	275
	1100/80/81/82	6	138.0	5,100	3/77	150	165	315	100
	1100/83	7	222.0	8,200	7/78	1	1	2	2
	1100/84	7	268.0	9,900	11/78	1	1	2	2
	Subtotal					601	828	1,429	379
	301	4	6.7	295	10/60	7	2	9	X
	501	5	15.8	695	6/59	-	-	-	X
	3301	5	23.0	1,021	6/64	29	-	29	X
	Spectra 70/15	3	4.6	203	9/65	2	-	2	X
	Spectra 70/25	3	7.8	343	9/65	-	7	7	X
	Spectra 70/35	4	14.4	634	1/67	34	3	37	X
	Spectra 70/45	5	27.0	1,181	11/65	78	2	80	X
	Spectra 70/46	5	45.0	1,963	11/68	10	-	10	X
	Spectra 70/55	5	41.0	1,800	11/68	1	-	1	X
	Spectra 70/60	6	51.0	2,245	9/70	17	-	17	X
	Spectra 70/61	6	53.0	2,350	3/71	3	1	4	X
	Spectra 1600	3	4.1	180	1/69	21	-	21	X
	Spectra 70/2	4	14.1	620	7/71	9	-	9	X
	Spectra 70/3	4	24.0	1,040	10/71	7	-	7	X
	Spectra 70/6	6	38.0	1,680	10/71	21	-	21	X
	Spectra 70/7	6	49.0	2,140	10/71	12	4	16	X
	Subtotal					251	19	270	
	Total					3,621	3,896	7,517	1,284
Xerox	Sigma 5	4	14.6	585	8/67	115	15	130	X
	Sigma 6	4	26.0	1,030	11/70	30	16	46	X
	Sigma 7	5	29.0	1,170	12/66	57	8	65	X
	Sigma 8	4	23.0	920	9/71	1	3	4	X
	Sigma 9	6	60.0	2,400	11/71	76	31	107	X
	530	3	4.5	180	8/73	97	18	115	X
	550/560	4	15.6	625	11/74	26	5	31	X
	940	5	26.0	1,050	4/66	33	3	36	X
	9300	3	8.5	340	11/64	12	4	16	X
	Total					447	103	550	
TOTAL						56,515	58,556	115,071	26,696

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MINICOMPUTER CENSUS

IDC categorizes certain computers as "minicomputers" based primarily on the perceived marketplace for these products. By definition, minis are general purpose in design, but are sold as tools as well as solutions; are available from makers in configurations ranging from board only to complete systems; are available to OEMs and are usually discounted in volume buys; are part of a family with low end products generally in the $1,000 - $25,000 price range; and have at least 4K RAM. Minicomputers range in size class from Microminis (M) which compete with high end microcomputers to Traditional Minis (T) to Superminis (S), which frequently compete with small General Purpose Computers in interactive commercial applications. This Census counts "Cumulative Number Shipped," making no attempt to account for retirements.

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	CUMULATIVE NUMBER SHIPPED OUTSIDE U.S.	CUMULATIVE NUMBER SHIPPED TOTAL	ORDERS FOR 1981 INSTALLATION
Ampex	8MS/8C	16	T	7	6	6/78	2,500	2,000	4,500	1,700
	Difference Series	16	T	14	19	12/80	15	0	15	150
	Total						2,515	2,000	4,515	1,850
Artonix*	PC-12/7	12	T	20	45	9/71	135	40	175	X
BTI Computer Systems	4000/15	16	T	30	35	1/76	341	8	349	X
	4000/25	16	T	42	49	1/76	251	12	263	X
	5000	16	S	30	39	9/78	2,265	65	2,330	860
	5000/ES	16	S	25	30	7/79	72	0	72	20
	8000	32	S	107	200	5/81	0	0	0	80
	Total						2,929	85	3,014	960
Bytronix	Series 500	16	T	3	4	9/80	75	25	100	750
	Series 1000	16	T	5	5	12/77	130	400	530	200
	Series 2000	16	T	8	8	12/78	50	90	140	50
	Series 3000	16	T	7	8	12/78	60	420	480	300
	Total						315	935	1,250	1,300
Century Computer Corp.	C-200	8	T	5	7	2/71	150	0	150	X
Cincinnati Milacron	CIP/2000 Series	8	T	4	17	7/69	4,650	800	5,450	NA
	CIP/4000 Series	10	T	4	17	12/76				X
Compiler Systems, Inc.*	CSI-16	16	T	11	20	11/70	80	10	90	X
	CSI-24	24	T	15	30	12/70	35	5	40	X
	Total						115	15	130	
Computer Automation, Inc.	108, 208, 808	8	T	5	11	4/68	280	30	310	X
	116	16	T	8	16	8/70	200	50	250	X
	216	16	T	8	20	7/69	350	45	395	X
	816	16	T	10	15	12/68	40	5	45	X
	Alpha 8, Naked Mini-8	8	T	2	3	5/72	5,002	1,340	6,342	X
	Alpha-16, Naked Mini-16	16	T	3	8	10/71				
	LSI 2/10, 2/20, 2/60	16	T, T, S	2	5	12/73	20,472	2,150	22,622	NA
	LSI 2/40	16	T	8	18	4/80	13	6	19	NA
	LSI 3/05	16	M	1	2	2/76	2,308	631	2,939	NA
	LSI 4/10	16	M	1	2	6/77	3,196	1,048	4,244	NA
	LSI 4/30	16	T	2	4	6/77	1,160	328	1,488	NA
	LSI 4/90	16	S	4	9	6/77	603	111	714	NA
	LSI 4/95	16	S	10	24	1/80	12	8	20	NA
	Scout Naked Mini 4/04	16	M	0.6	2	1/80	267	98	365	NA
	Total						33,903	5,850	39,753	
Computer Talk, Inc.	CT-400	16	S	25	30	9/75	4	0	4	1
	CT-407	16	S	32	37	12/77	2	0	2	1
	Total						6	0	6	2
Control Data Corp.	1700	16 + 2	S	37	160	3/66				X
	1700-SC	16 + 2	S	20	60	9/70				X
	System 17	16 + 2	T	14	39	2/74				X
	Cyber 18-10	16 + 2	T	14	40	/76	1,920	1,295	3,215	
	Cyber 18-20	16 + 2	T	16	75	/76				NA
	Cyber 18-30	16 + 2	S	110	116	9/76				
	Cyber 18-5	16 + 2	T	14	35	/77				
	Elbit-100	12	T	6	8	6/77	5	445	450	X
	Total						1,925	1,740	3,665	
Data General Corp.	MP 100, 200	16	M	1	3	5/79	2,550	750	3,300	2,500
	MicroNova	16	M	2	4	11/79	4,270	1,990	6,260	2,200
	Nova	16	T	6	12	2/69	770	380	1,150	X
	Nova 2 Series	16	T	3	10	10/73	7,280	2,720	10,000	150
	Nova 3/4	16	T	4	10	1/76	3,770	1,230	5,000	
	Nova 3/12	16	T	5	18	1/76	12,360	5,640	18,000	8,000
	Nova 3/D	16	T	12	36	10/76	2,600	2,400	5,000	
	Nova 4/C	16	T	3	12	3/79				
	Nova 4/S	16	T	3	16	3/79	4,800	3,200	8,000	9,500
	Nova 4/X	16	T	10	33	3/79				
	Nova 800/820	16	T	7	40	3/71	2,210	790	3,000	X
	Nova 830/840	16	S	16	44	7/73	670	350	1,020	X
	Nova 1200 Series	16	T	3	11	12/70	10,870	4,130	15,000	X
	Super Nova SC	16	T	9	27	4/70	340	160	500	X
	Eclipse S100, 130, 140	16	S	11	30	2/75	2,000	1,000	3,000	700
	Eclipse AP/130	16	S	30	50	9/78				
	Eclipse S200, 230	16	S	15	55	2/75	3,350	1,150	4,500	700
	Eclipse S/250	16	S	35	150	11/78	340	110	450	100
	Eclipse C/150	16	S	55	120	12/78	250	150	400	150
	Eclipse C/300, 330	16	S	24	150	2/75	970	230	1,200	300
	Eclipse C/350	16	S	130	180	11/78	450	150	600	330
	Eclipse M/600	16	S	164	215	5/78	270	80	350	320
	Eclipse MV/8000	32	S	153	300	10/80	25	15	40	400
	Subtotal						60,145	26,625	86,770	25,350
	DCC-112	12	T	3	12	8/70	700	400	1,100	X
	DCC-116	16	T	5	10	11/71	7,450	1,350	8,800	X
	DCC-416/616	16	T/S	3	7	9/75	125	15	140	X
	DCC-Model 5	16	T	3	6		80	10	90	X
	Subtotal						8,355	1,775	10,130	25,350
	Total						68,500	28,400	96,900	25,350
Datamate Computer Systems*	DM-16	16	T	17	26	11/69	12	0	12	X
	DM-70	16	T	9	15	12/70	25	0	25	X
	ECP-18	18	T	14	16	11/66	21	0	21	X
	Total						58	0	58	
Datum, Inc.*	Enhancer E 1/16	16	T	8	15	3/76	15	3	18	X
Digiac Corp.*	3060		T	9	13	1/70	70	20	90	X
	3080	25	T	20	25	12/64	14	2	16	X
	Total						84	22	106	
Digital Equipment Corp.	PDP-8/a, e, f, m	12	T	4	15	4/71	34,300	15,950	50,250	700
	PDP-8/i, l, s	12	T	8	27	5/65	5,765	3,685	9,450	X
	PDP-9, 9L	18	T	35	50	12/66	290	160	450	X
	PDP-11/03, LSI-11	16	M	2	3	6/75	80,650	45,850	126,500	71,000
	PDP-11/23, LSI 11/23	16	M	2	6	/79				
	PDP-11/04, 05, 10, 15, 20	16	T	5	17	3/70	30,650	17,250	47,900	4,700
	PDP-11/34, 35, 40	16	T	9	40	1/73	21,900	15,600	37,500	11,000
	PDP-11/44	16	S	23	60	/80	1,500	400	1,900	4,500
	PDP-11/45, 50, 55	16	S	24	91	4/72	3,500	1,500	5,000	400
	PDP-11/60	16	S	26	75	6/77	970	950	1,920	50
	PDP-11/70	16	S	60	175	7/75	6,600	3,100	9,700	1,700
	VAX-11/750	32	S	47	100	/80	180	20	200	800
	VAX-11/780	32	S	128	255	5/78	1,450	900	2,350	3,000
	PDP-12	12	T	13	46	4/69	510	255	765	X
	PDP-15 XVM	18	T	15	82	2/70	550	320	870	X
	Total						188,815	105,940	294,755	97,850

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MINICOMPUTER CENSUS - (Continued) AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	CUMULATIVE NUMBER SHIPPED OUTSIDE U.S.	CUMULATIVE NUMBER SHIPPED TOTAL	ORDERS FOR 1981 INSTALLATION
Digital Microsystems	Hex-29	16	S	13	22	4/79	15	15	30	50
Digital Scientific Corp.	Meta-4/4000	16	S	29	90	4/70	140	15	155	X
	Meta-4/5010	16	S	21	40	10/78	5	0	5	X
	Meta-4/5020	16	T	25	90	4/78	45	0	45	NA
	Meta-4/5030	16	S	53	140	6/79	10	0	10	NA
	Total						200	15	215	
Electronic Associates, Inc.	Pacer-100	16	T	15	40	5/72	160	128	288	NA
Foto-Mem, Inc.*	Contour-100	8	T	6	20	4/70	25	0	25	X
Four-Phase Systems, Inc.[a]	Two Pi V/32	32	S	125	125	6/78	100	6	106	X
	System 311	32	S	160	265	/81	0	0	0	NA
	System 312	32	S	210	320	/81	0	0	0	NA
	Total						100	6	106	
General Automation, Inc.	GA-18/30	16	S	18	50	7/69	780	210	990	X
	SPC-12	8	T	4	16	1/68	3,250	860	4,110	X
	SPC-16	16	T	5	25	5/70	7,490	1,980	9,470	X
	16/110, 220	16	M	1	3	12/75	6,080	1,940	8,020	3,000
	16/330, 340	16	T	3	10	1/76	405	140	545	140
	16/440, 460	16	S	12	30	7/75	2,000	565	2,565	470
	16/550	16	S	25	50	3/78	9	2	11	X
	230, 240	16	M	7	9	5/80	373	162	535	800
	470, 480	16	S	16	21	8/80	350	170	520	780
	Total						20,737	6,029	26,766	5,190
GRI Computer Corp.	909 Series	16	T	4	9	1/70	320	150	470	X
	99/30, 38	16	T	5	15	6/72	578	268	846	X
	99/10, 18	16	T	3	5	6/72	24	0	24	X
	99/40, 48	16	T	6	17	6/72	207	278	485	X
	99/50, 58	16	T	6	12	/74	146	44	190	X
	99/52	16	T	8	17	/76	7	3	10	X
	GRIP	16	T	30	30	11/78	25	0	25	100
	Total						1,307	743	2,050	100
GT&E*	IS/I	16	T	14	36	1/70	160	40	200	X
	IS/1000	16	T	6	10	6/72	4,000	75	4,075	X
	Total						4,160	115	4,275	
Harris	6024/1	24	S	69	135	5/69	21	1	22	X
	6024/3	24	S	49	90	2/70	118	1	119	X
	Slash 4	24	S	24	110	8/73	233	18	251	13
	Slash 5	24	S	16	50	5/72	649	10	659	6
	Slash 6	24	S	20	70	12/76	275	10	285	76
	Slash 7	24	S	45	180	10/75	18	1	19	X
	Series 100	24	S	85	190	10/75	37	1	38	X
	Series 200	24	S	179	240	10/75	52	3	55	1
	Series 1X5	24	S	85	175	9/77	110	25	135	10
	Series 5X0	24	S	195	300	12/78	72	8	80	X
	H80	24	S	70	125	2/81	0	0	0	28
	H100	24	S	45	150	11/79	103	9	112	58
	H300	24/48	S	105	200	/81	0	0	0	5
	H500	24/48	S	100	250	11/79	117	4	121	83
	H800	24/48	S	170	275	3/80	51	4	55	48
	Total						1,856	95	1,951	328
Hewlett-Packard	2100A	16	T	7	15	6/71	7,900	3,400	11,300	X
	2100S	16	T	16	36	8/73	1,825	1,425	3,250	X
	2114/15/16	16	T	9	29	11/66	2,495	1,145	3,640	X
	1000-M (MX-M, K)	16	T	2	16	6/74	7,979	6,224	14,203	1053
	1000-E (MX-E)	16	T	6	22	1/77	7,060	7,040	14,100	8,100
	1000-F	16	T	12	40	9/78	2,270	1,403	3,673	
	1000-L	16	T	2	10	6/79	242	207	449	
	3000-I	16	S	100	200	11/72	1,420	880	2,300	X
	3000-II	16	S	100	200	4/76				X
	3000-III	16	S	92	200	6/78	1,195	1,105	2,300	500
	3000-33	16	S	58	135	1/79	700	600	1,300	1,000
	3000-30	16	S	50	105	10/79	200	150	350	350
	3000-44	16	S	109	200	3/81	0	0	0	NA
	Total						33,286	23,579	56,865	
HIS-GE/PAC	30	8	T	7	35	5/69	225	50	275	X
	3010, 2	16	T	13	90	5/70	25	1	26	X
Honeywell	112	12	T	5	10	11/69	222	48	270	X
	116/316/416/516	16	T	8	62	10/66	2,405	1,295	3,700	X
	700 Series	16	T	16	65	6/72	1,954	1,531	3,485	X
	166X Series	16	T	144	440	12/69	20	8	28	X
	6/06	16	T	6	25	1/76				
	6/23	16	T	6	25	/78				
	6/33	16	T	4	40	5/78	2,930	1,980	4,910	2,500
	6/34	16	T	4	18	1/76				
	6/36	16	T	4	35	1/76				
	6/43	16	S	7	110	1/77				
	6/47	16	S	19	160	8/78	3,570	2,420	5,990	2,100
	6/53	16	S	19	145	5/78				
	6/57	16	S	44	225	/78				
	Total						11,351	7,333	18,684	4,600
Information Technology, Inc.*	4900/10	16	T	10	20	10/65	25	0	25	X
IBM	Series/1	16	T	5	30	11/76	13,800	5,800	19,600	8,200
Intersil	LSI 8	12	T	3	7	7/80	50	50	100	NA
Keronix	IDS-16/8	16	T	4	5	4/74				
	IDS-16/10	16	T	3	5	4/74	2,900	270	3,170	20
	IDS-16/12	16	T	3	4	4/74				
Lear Siegler*	VDP-410	16	T	4	4	10/78	100	50	150	X
Lockheed Electronics Company, Inc.*	LEC-16	16	T	11	18	3/69	2,590	435	3,025	X
	SUE	16	T	6	11	9/72	2,878	472	3,350	X
	Total						5,468	907	6,375	
Microdata Corp.	400	8	T	3	4	1/70	155	0	155	X
	800 Series	8	T	6	11	5/69	2,055	1,380	3,435	X
	1600	8	T	5	11	2/72	6,825	1,177	8,002	75
	3200/3230	16	S	8	14	3/74	115	110	225	X
	Micro One	8	M	1	3	11/74	800	120	920	X
	Total						9,950	2,787	12,737	75
Minicomp*	MD-708	8	T	5	7	8/70	50	0	50	X
Modular Computer Systems	Modcomp I	16	T	2	9	10/71	698	142	840	X
	Modcomp II	16	T	13	41	3/71	2,187	534	2,721	2
	Modcomp III	16	S	13	44	12/70	72	5	77	X
	Modcomp IV	16/32	S	48	100	5/74	339	130	469	X
	Classic 7810	16	T	8	25	5/79	269	25	294	8
	Classic 7820	16/32	S	16	38	12/80	4	0	4	12
	Classic 7830	16/32	S	29	55	9/79	139	30	169	61
	Classic 7840	16/32	S	28	70	12/80	8	0	8	58
	Classic 7860	16/32	S	38	100	1/78	134	52	186	9
	Classic 7870	16/32	S	64	128	8/78	201	79	280	55
	Total						4,051	997	5,048	205

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MINICOMPUTER CENSUS - (Continued)

AS OF JANUARY 1, 1981

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	SIZE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	CUMULATIVE NUMBER SHIPPED IN U.S.	CUMULATIVE NUMBER SHIPPED OUTSIDE U.S.	CUMULATIVE NUMBER SHIPPED TOTAL	ORDERS FOR 1981 INSTALLATION
Motorola Communications Division*	MDP-1000	8	T	8	19	2/69	75	0	75	X
New England Digital Corp.*	Able Series 40	16	T	8	10	6/77	100	25	125	X
	Able Series 60	16	T	10	12	6/78	75	10	85	X
	Total						175	35	210	
Omnitec (Bit)*	480	8	T	6	17	12/66	195	3	198	X
	483	8	T	9	33	1/70	115	40	155	X
	Total						310	43	353	
Perkin-Elmer Corp.	1	8	T	4	11	9/70	210	77	287	X
	2, 3, 4, 5	16	T	9	21	5/67	614	153	767	X
	13, 15, 16, 18	16	T	15	33	9/69	14	14	28	X
	50, 55	16 + 1	T	7	33	4/72	133	40	173	X
	70	16	T	9	65	12/71	1,060	342	1,402	X
	74	16	T	3	34	2/73	300	56	356	X
	80, 85	16	T	15	50	7/72	70	18	88	X
	5/16	16	M	1	5	1/77	269	78	347	X
	6/16	16	T	2	15	1/76	1,700	743	2,443	300
	7/16	16	T	3	18	2/74	3,732	840	4,572	120
	8/16	16	T	4	25	1/77	506	189	695	150
	7/32	32	S	10	35	7/74	1,421	448	1,869	200
	8/32	32	S	55	160	6/75	650	264	914	125
	Series 16	16	T	5	22	4/79	360	135	495	550
	3220	32	S	34	90	5/79	364	247	611	500
	3240	32	S	85	185	10/79	108	52	160	220
	3230	32	S	47	120	3/81	0	0	0	NA
	Total						11,511	3,696	15,207	
Point 4 Data Corp.[b]	Point 4 Mark 5	16	T	5	7	3/79	1,600	400	2,000	1,800
	Point 4 Mark 3	16	T	NA	3	5/81	0	0	0	NA
	Point 4 Mark 8	16	T	NA	9	5/81	0	0	0	NA
Prime Computer	100	16	T	6	12	4/73				
	200	16	T	7	22	11/72				
	300	16	S	12	58	9/73	1,500	1,340	2,840	20
	400	16	S	62	207	6/76				
	500	16	S	126	330	6/76				
	150, II	32	S	35	NA	6/80				
	250, II	32	S	50	NA	6/80				
	350	16/32	S	31	116	7/78				
	450	16/32	S	50	75	2/79	1,920	1,240	3,160	3,500
	550	16/32	S	70	125	2/79				
	650	16/32	S	95	165	2/79				
	750	32	S	130	200	7/79				
	Total						3,420	2,580	6,000	3,520
Raytheon Data Systems	703	16	T	13	23	10/66	179	33	212	X
	704	16	T	10	18	3/70	700	200	900	X
	706	16	T	19	30	5/69	75	17	92	X
	RDS-500	16	S	17	21	12/73	1,125	265	1,390	NA
	Total						2,079	515	2,594	
Redcor Corp.*	RC 70	16 + 2	T	15	30	7/68	100	40	140	X
SCI Systems, Inc.	Mercury 3	16	T	6	13	/78	450	50	500	240
Sperry-Univac	5201	16	T	6	13	9/68	330	170	500	X
	620/a	16	T		75	12/65	120	30	150	X
	520/f, f-100	16	T	10	23	6/70	470	220	690	X
	620i	16/18	T	10	20	12/65	920	380	1,300	X
	620/L + 100C	16	T	5	12	2/71	720	320	1,040	X
	620/L-100	16	T	6	14	6/72	1,093	554	1,647	NA
	H620/i, R622/i	16/18	T	15	29	6/69	180	80	260	10
	V-72	16	T	10	45	2/74	1,090	443	1,533	NA
	V-73	16	S	16	45	11/72	1,190	530	1,720	X
	V-74	16	S	40	80	5/74	210	90	300	X
	V-75	16	S	39	80	8/75	120	50	170	X
	V-76	16	S	8	16	1/76	734	319	1,053	NA
	V-77-200	16	T	2	15	1/77	852	246	1,098	NA
	V-77-400	16	T	5	28	12/76	306	230	536	NA
	V-77-500	16	S	30	60	3/81	0	0	0	600
	V-77-600	16	S	18	65	3/77	1,063	310	1,373	NA
	V-77-700	16	S	34	90	3/81	0	0	0	650
	V-77-800	16	S	22	95	3/79	380	166	546	NA
	Total						9,778	4,138	13,916	
Systems Computer Corp.*	1000	8	T	1	4	1/71	400	200	600	X
Systems Engineering Laboratories	32/30, 35	32	S	30	80	9/76	150	50	200	
	32/55, 57	32	S	50	125	8/75	550	170	720	
	32/75, 77	32	S	70	150	3/78	550	100	650	400
	32/27	32	S	25	60	1/81	0	0	0	
	32/87	32	S	250	350	/81	0	0	0	
	Total						1,250	320	1,570	
Tandem Computer, Inc.	T16	16	S	95	140	5/76	1,152	386	1,538	NA
	NonStop II	16	S	144	200	1/81	0	0	0	NA
	Total						1,152	386	1,538	
Telefile Computer Products	TCP-16/5	16	T	12	15	9/77	130	30	160	135
Texas Instruments	960-A/B	16	T	14	30	12/71	3,400	1,600	5,000	X
	980-A/B	16	S	17	40	10/72	3,450	1,550	5,000	X
	990/4	16	M	1	8	6/76	7,200	2,550	9,750	1,200
	990/10	16	T	20	25	3/76	9,800	4,150	13,950	5,500
	990/5	16	M	3	8	3/79	1,450	750	2,200	1,840
	990/12	16	S	29	70	11/79	725	305	1,030	1,200
	Total						26,025	10,905	36,930	9,740
Unicom, Inc.*	CP-8	8	T	3	8	2/70	343	165	508	X
Unicomp*	Comp-16	16	T	11	29	6/70	26	0	26	X
	Comp-18	18	T	12	38	8/70	38	0	38	X
	Total						64	0	64	
Westinghouse Electric	P-50	14	T	16	23	8/64	182	40	222	X
	P-2000	16	T	10	27	8/69	111	90	201	X
	2500 F	16	T	10	30	11/71	339	125	464	10
	Total						632	255	887	10
Xerox*	CE-16, 16/A	16	T	8	23	6/69	35	10	45	X
	Sigma-2	16	T	24	125	12/66	170	80	250	X
	Total						205	90	295	
TOTAL							473,426	218,599	692,025	

Notes

a) Two Pi Corporation was purchased by Four-Phase Systems, Inc. during 1980.
b) Corporate name changed from Educational Data Systems, March 1, 1980.
NA) Data is not available.
X) Indicates minicomputer models not in new production.

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• IN A MOVE DESIGNED TO KEEP PCM USERS in the IBM software fold, and perhaps motivated slightly by pressure from antitrust charges filed abroad, IBM indicated it will offer its System Installation Productivity Options (IPO) to users of plug compatible hardware, thus supporting them the same as IBM users. With IPOs, a user receives updates tailored to the assemblage of his system's software. IBM may want to round up PCM users into the IBM software fold so the lure of a new operating system might be attractive to those users. National Advanced Systems withdrew its complaint to the European Economic Community regarding the unavailability of IPOs to PCMs.

• IBM MAKES WAY FOR System/36? IBM cut the purchase price of the System/34 by $5,000 for those with 8.6- and 13.2 Mbyte disk and lopped $6,000 off the 27.1 Mbyte model, effective immediately. Henceforth these 34s will be available only on a purchase basis. Perhaps because these models were available on two year leases, IBM is trying to avoid having new systems turned back in prior to full payback. Similarly, there is a "starter" set of programs carrying a one-time charge, instead of the customary monthly lease. Utilities and system support program and Basic or RPG II cost $3,240 or $3,000. These are designed for systems with up to four CRTs, and four printers without communications. IBM also unveiled business applications software for the 34.

• SYSTEM/38 MOD 4 LOOKS LIKE NEW LOW END of that line. IBM cut 16% off of purchase, lease, and rental prices of the 38/3. The /4 has about 35% greater internal performance than the /3, and the same 200 nsec control storage as the /5 and also supports the 3370 drive. Maximum memory is 2 Mbytes. The /4 is upgradeable from the /3 and to the /5. Typical configuration, with 1.5 Mbytes, 635 Mbyte disk, 15 workstations, and a line printer, is $202,100 or $6,078/mo. Should give some superminis a run for the money. The new tag on a /3 with four workstations is $112,350. IBM also apparently likes volume discounts for purchases -- it is offering 6% to 15% discounts on major components of the 5280 distributed data system and the 5520 administrative system.

• XEROX PLAYS BALL IN DESKTOP REALM -- the question is, when does IBM get off the bench? In a blatant move for market share, Xerox's Office Products Division announced the 820 "worm," a $2,995 desktop ($5,895 with printer) that is a state-of-the-commerce product basically much the same as other CP/M-based systems with basic word processing software; it uses many Xerox components.

Why is this news? Xerox will support it on several levels, market it directly to the Fortune 500 and use the 820 to open every conceivable avenue of distribution to Xerox. (There was a hint Xerox is attempting to sign a major retailer.) Obviously a first salvo with plans to see the Xerox name on more desks. EDP/IR has a hunch this is the machine that is supposed to make OPD profitable in 1981. Xerox plans to ship "lots of tens of thousands" by year-end. Software is separate, but on a one-time fee basis -- CP/M $200 and word processing $500. Uncoincidentally, Wang cut $1,000 off of single quantity Wangwriters bringing the price to $6,400, announced discounts, and said it will add CP/M. Xerox is endowing its 860 with CP/M and 3270.

• TEXAS INSTRUMENTS KILLS BUBBLE memory product line, despite recent announcements of products incorporating bubbles. TI observed bubbles had become merely a niche in the memory market rather than a broad-based segment.

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